



THERMAL PRINTING SOLUTIONS

ASTRIUM PRINTER

USER MANUAL

Reference: 3108343 - Issue A



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EVOLUTIONS

Date	Issue	Modifications
02/2005	Z	Creation
05/2005	A	Addition of duty cycle and more information about power supply

INTRODUCTION

This single-station (receipt only) thermal printer is addressed to the retail market. Widely used in the restaurant scenario, this printer model is also highly suitable for a number of other applications ranging from newspaper agents to department stores, specialty stores and certain supermarkets.

Among the outstanding features this receipt-only printer model has to offer is a Clamshell-type opening (for simplified paper roll loading), a very small footprint, an incorporated cutter the possibility of dual-color printing, an interchangeable interface slot and a drawer kick-out connector.

The printer can be installed vertically (so the paper is output frontward) or horizontally (so the paper is output upwards).

The following options are available:

- a. Slot-pluggable interfaces:
 - 1. RS232 C serial (female 25-pin connector)
 - 2. RS232 C serial (female 9-pin connector) with RJ display connector
 - 3. USB with RJ display connector
 - 4. Bi-directional PARALLEL
- b. Wall mounting bracket (vertical position)
- c. Kit for using 58 and 60 mm wide paper rolls
- d. Spill resistance cover (available on specific request)

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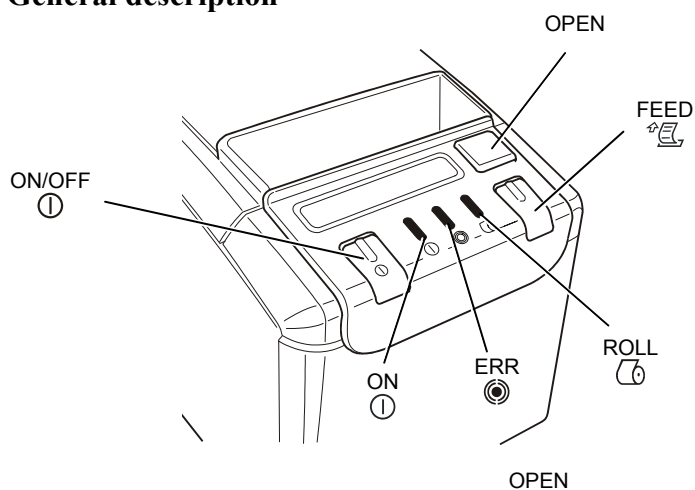
1 TECHNICAL SPECIFICATIONS

The following table gathers the main characteristics of the printing unit.

ITEM	VALUE	UNIT
Technology	Direct thermal	-
Printing resolution	203 dpi/8 dots per mm	(8 dots per mm)
Resolution of the received bitmaps	203 x 203 dpi	-
Character size	Font A: 1.41(W) x 3.39(H) Font B: 0.99 (W) x 2.40 (H)	mm
Character sets	Font A (predefined): 15 cpi, Font B: 20 cpi	-
Print field	72 mm, 576 dots	-
Speed	Up to 200	mm/s
Columns	Font A: 42 / Font B: 56	-
Paper loading	Clamshell TH	-
Receipt width	80	mm
Paper roll diameter	Up to 100	mm
Roll core diameter	Internal: 12.7, External: 18 (suggested)	mm
Cutter	Automatic (partial cut), manual (with tear bar)	-
User Flash memory	384	KBytes
Data reception buffer	4 Kbytes / 45 bytes	
Interface (according to version)	Mutually exclusive, available on a slot pluggable interface board: - RS 232 C (25-pin connector), - RS 232 C (9-pin connector + display connector), - Bi-directional parallel, - USB (with display connector) - Ethernet soon available	-
Dimensions (WxDxH)	140 x 217 x 157	mm
Weight	About 1.9	Kg
Temperature	Operating: +10 to 40 °C, Storage: -15 to 40 °C	°C
Humidity	Operating: HR 20 to 85% (non- condensing) Storage: HR 5 to 90% (non- condensing)	-
Power supply: - Input - Output	100 - 240 50 - 60 24 72	V Hertz V DC Watt
Power consumption: - Standby - Operating	< 5 36 (average)	Watt Watt
Power supply unit	External (110/240 Vac, 50-60 Hz), with detachable power cord	Hertz

2 MECHANICAL FEATURES

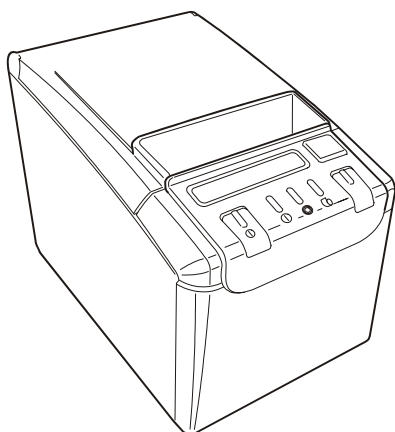
2.1 General description



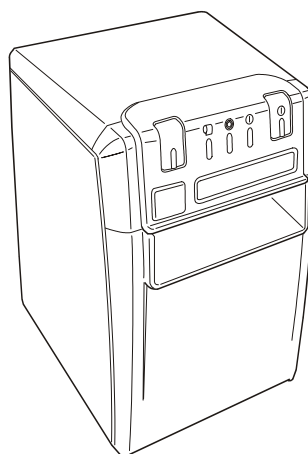
2.2 Physical characteristics

Width: 140 mm
 Depth: 217 mm
 Height: 157 mm
 Weight: 1.9 Kg

Horizontal installation



Vertical installation



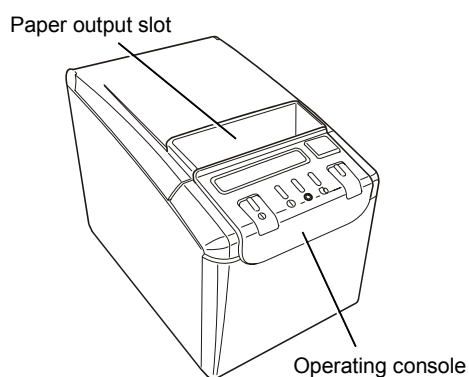
3 INTERFACE BOARD FEATURE

3.1 Printer location

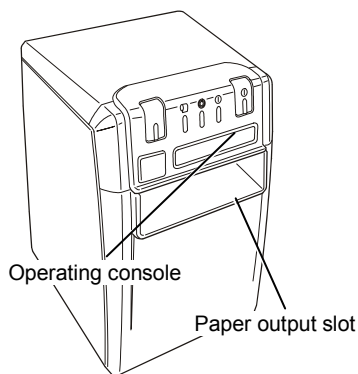
Installing the printer horizontally or vertically so the paper is expelled upward, or vertically so the paper is expelled from the front.

EXTERNAL VIEW

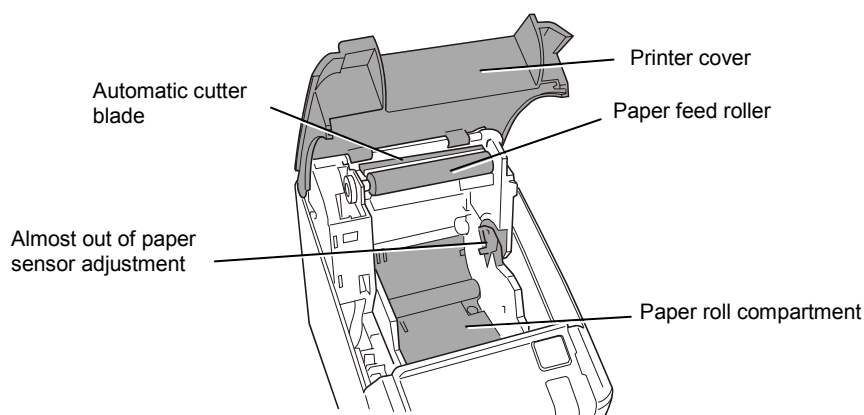
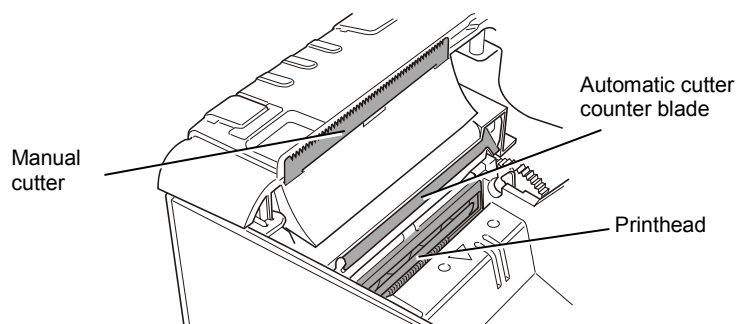
Horizontal Installation



Vertical Installation



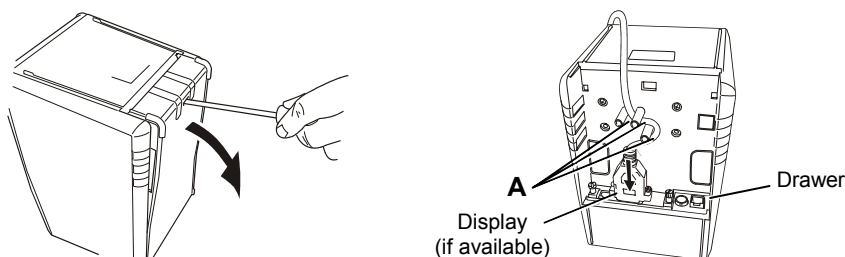
INTERNAL VIEW



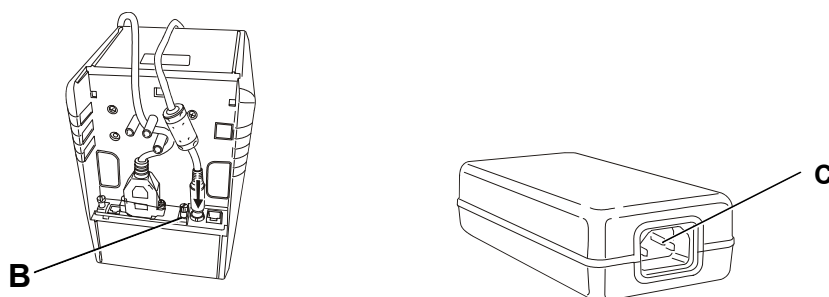
3.2 Plugging & Connecting Your Printer

3.2.1 Connecting the power supply

- Unpack the printer and all its components. Open the printer cover by pressing the Open button on the operating console as far as it goes (until hearing a click sound indicating that the button is locked in a pressed position) **and then remove the piece of cardboard protecting the print head.**
- Position the printer vertically and then open and remove the rear connectors' cover by releasing its snap hook, using a screwdriver, and lifting it off. Plug the interface cables into the related connectors on the printer and then route the cables through the cable blocks (A) to prevent accidental disconnections. Tighten the securing screws, if present, of the interface cable connectors.

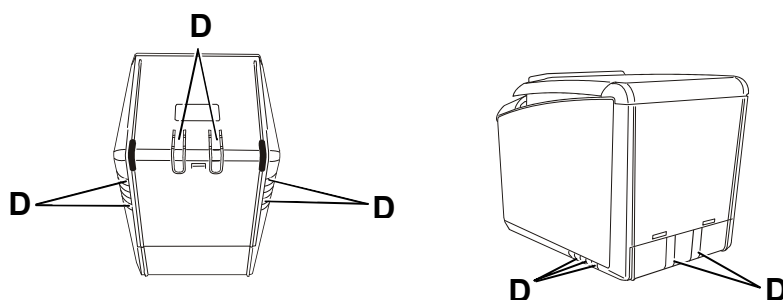


- Plug the power cord of the external power supply unit into printer power jack (B). Attach one end of the power cord, provided with the printer, into the related connector (C) on the external power supply unit.

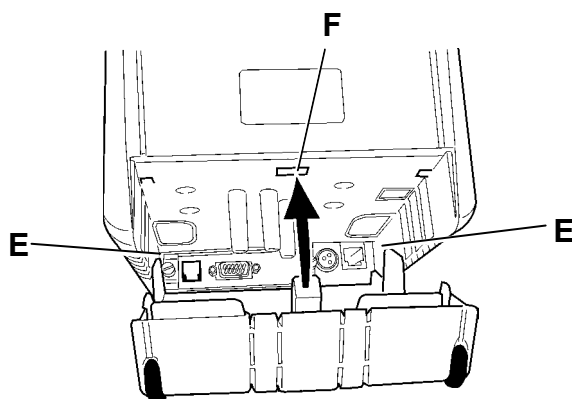


- Using a screwdriver, remove extractable parts (D) so that you can then route the cables externally according to your needs. Ensure that the passage slots are completely clear of any plastic protrusion that could damage the cables.

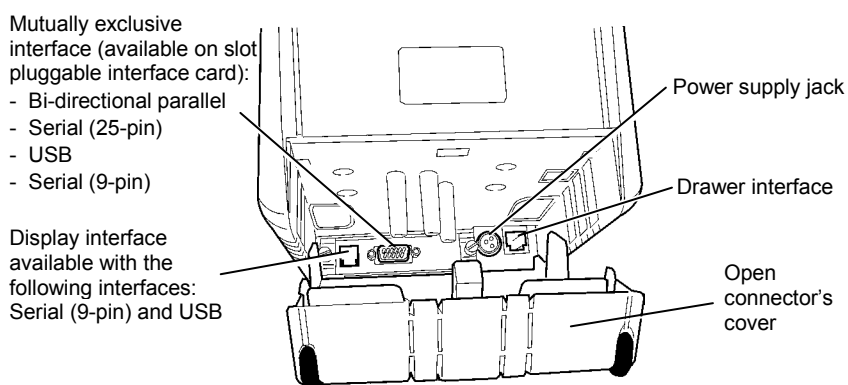
WARNING: Once removed, the extractable parts cannot be reattached.



- Refit the connectors' cover by inserting the cover's lower and upper tabs into the corresponding slots (E) and (F), routing the cables through the passage slots that were opened in the previous step.



VIEW BEHIND THE CONNECTORS' COVER



- Make sure that the printer and all the devices connected to it are powered off and then insert the free end of the power cord into the electrical power outlet.
- Power on the printer as explained in the section Powering On the Printer.
- Load the paper roll as explained in the section Loading the Thermal Paper Roll.

3.2.2 Powering on the printer

- Ensure that the printer's external power supply unit is attached to an easily accessible electrical power outlet.
- Press the ON/OFF button on the operating console.

NOTE: Under normal operating conditions only the green power (ON/OFF) LED should be on when the printer is powered on. Therefore if the LED on the operating console indicate a different machine status, refer to the troubleshooting section for the related corrective actions.

Button Functions and LED States

BUTTON/ LED	DESCRIPTION
ON/OFF (ⓘ)	❑ Press once to power on the printer. ❑ With the printer powered on, press for more than 2 seconds to power it off.
OPEN	❑ Press to unlock the printer cover so that it can be opened.
FEED (⏏)	❑ Press once to advance the paper one line feed. ❑ Press and hold down to feed the paper continuously.
ON (ⓘ)	❑ When off: Printer powered off. ❑ When on green: Printer powered on. ❑ When flashing green: Thermal print head overheated, printer busy.
ERR (⊗)	❑ When off: Printer in normal operating conditions. ❑ When on red: Paper jam, cutter locked, printer failure.
ROLL (⏏)	❑ When off: Printer loaded with paper. ❑ When on yellow: Printer almost out of paper. ❑ When flashing yellow: Printer out of paper.

3.3 Communication's Management

This section explains how to install slot-pluggable interface boards on this printer model. One of the following slot-pluggable interface boards can be installed:

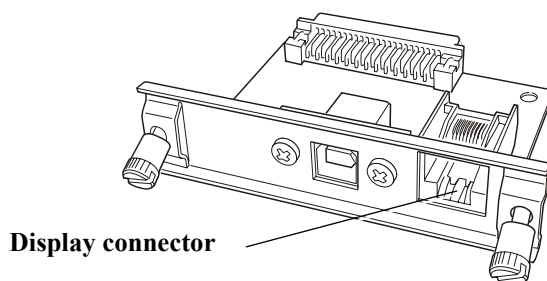
1. 9-pin or 25-pin RS232 serial
2. USB
3. Bi-directional parallel

WARNING: Before proceeding with any type of operation, unplug the power cord of the external power supply unit from the electrical power outlet and bear in mind the information provided in the section of this manual entitled Safety Precautions and General Operating Norms.

3.3.1 USB Interface Board

The following figure shows the USB interface board that can be installed.

USB Interface Board

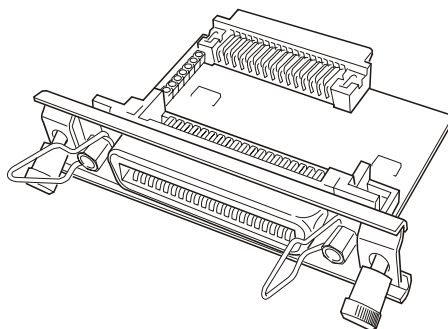


See page 1-9 of this manual for the Display Output Connector pinout.

3.3.2 Parallel Interface Board

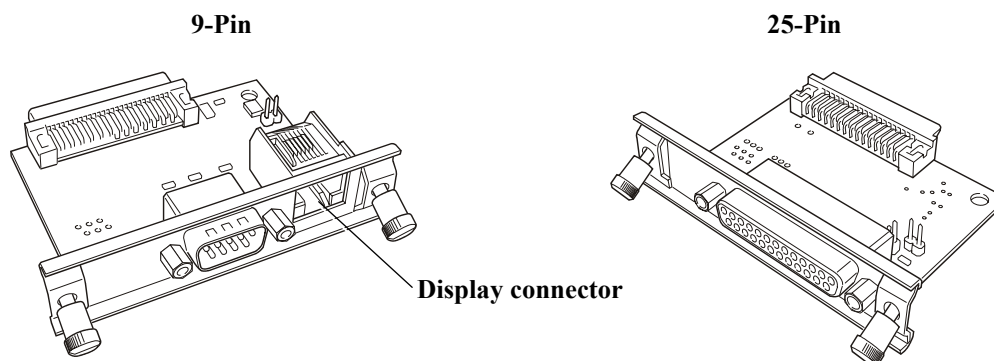
The following figure shows the parallel interface board that can be installed on the printer.

Parallel Interface Board



3.3.3 Serial Interface Board

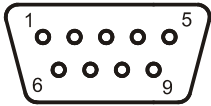
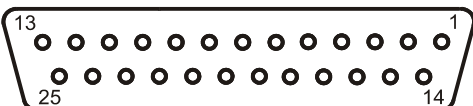
The following 9-pin or 25-pin serial interface board can be installed on the printer.



3.3.3.1 Serial Interface Board Pinouts

9-pin and 25-pin Serial Interfaces

The table below gives the pinouts of the 9-pin and 25-pin serial interfaces.

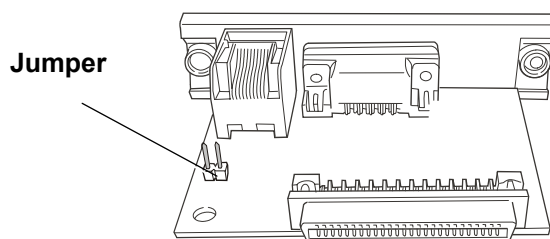
 9-Pin Serial		 25-Pin Serial	
1	Not used	1	GND
2	RxD	2	TxD
3	TxD	3	RxD
4	DTR	4	RTS
5	GND	5	CTS
6	DSR	6	DSR/Reset (According to jumper configuration)
7	RTS	7	GND
8	CTS	8	Not used
9	Not used	9 - 19	Not used
		20	DTR
		21 - 24	Not used
		25	Reset (According to jumper configuration)

Pinout PRT100 side		CONNECTIONS	Pinout PC side	
9 pin	25 pin		25 pin	9 pin
3	2 TX		TX 2	3
2	3 RX		RX 3	2
7	4 RTS		RTS 4	7
8	5 CTS		CTS 5	8
1	8 DCD		DCD 8	1
4	20 DTR		DTR 20	4
6	6 DSR		DSR 6	6
5	7 GND		GND 7	5
9 NC	1		1	9 NC

Configuring the Serial Interface Board

Before installing the board, you need to configure the jumpers accordingly. Refer to the information provided in the tables below.

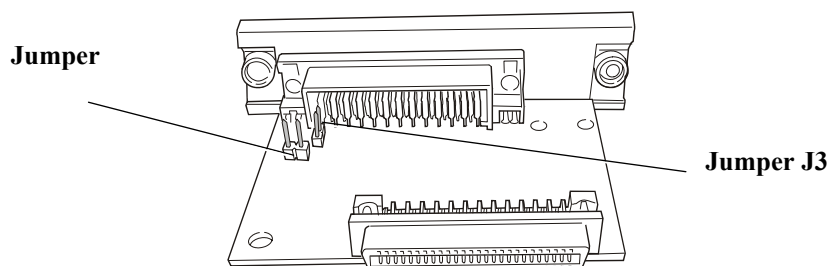
9-pin Serial



INSTALLED (ON)	I/F pin 6 used as Reset signal
NOT INSTALLED (OFF)	I/F pin 6 used as DSR signal

When the jumper is installed, the printer is reset when the signal remains MARK for 1 ms or more.

25-pin Serial



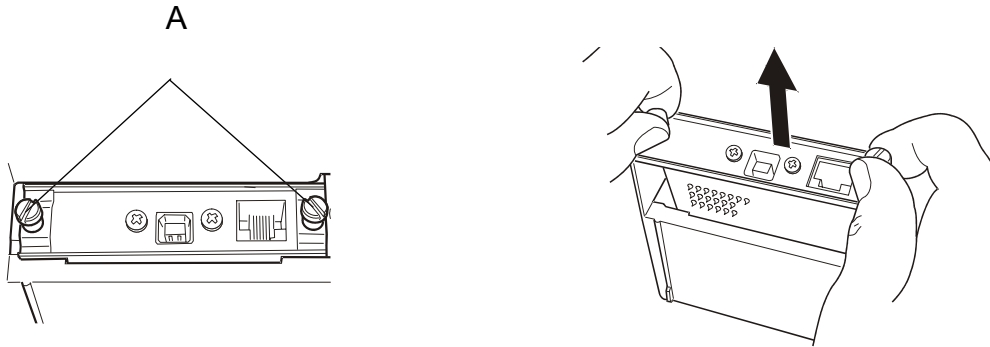
Jumper J2	INSTALLED (ON)	I/F pin 6 used as Reset signal
	NOT INSTALLED (OFF)	I/F pin 6 used as DSR signal
Jumper J3	INSTALLED (ON)	I/F pin 25 used as Reset signal
	NOT INSTALLED (OFF)	Not used

When jumper J3 is installed, the printer is reset when the signal remains SPACE for 1 ms or more.

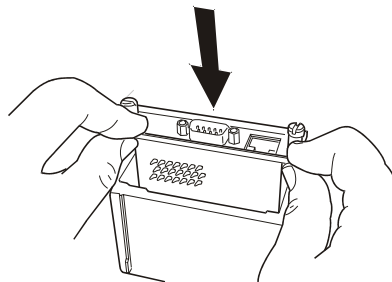
3.3.4 Installation Procedure

Provided below is the procedure for installing an interface board. This procedure applies to both slot-pluggable interface boards available.

- Unscrew the two screws **A** and extract the old board from its slot.



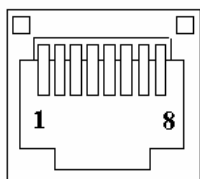
- Insert the new board into the slot, pushing it as far as it goes. Ensure that it plugs correctly with the related connector on the main board. Secure the board in place by tightening the two screws **A**. The printer FW will automatically detect the new board installed.



3.3.4.1 Display connector

Slot-pluggable Interface boards (9-pin RS 232 and USB) are available with **Display connector**.

Pinout of the Display Output Connector



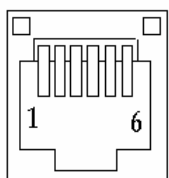
- 1 Safety ground
- 2 Transmit data to print
- 3 Receive data from printer
- 4 Indicates whether the printer can receive data or not
- 5 Indicates whether the display can receive data or not
- 6 Signal ground
- 7 Power supply terminal
- 8 Power supply retrace line

Note: The signal Transmitted Data (pin 2) is not connected; the signal Data Set Ready (pin 4) is always in ON state, by means of a pull-up resistor.
For this reason, both signals are not included in the printer display data exchange.

3.3.4.2 Drawer driver

A drawer connector is resident on the main board.

Output connector:



- 1 Frame ground
- 2 Drawer kick-out drive signal
- 3 Drawer open/close signal
- 4 + 24 V
- 5 Drawer kick-out drive signal
- 6 Signal ground

The driver for the drawers controls two solenoids and a drawer open/closed sensor, with the following characteristics:

Resistance of solenoids	24 ohm min
Output voltage	24 volts
Current	1 amp max.
Printer side connector	Molex 52065-6615

Drawer drive signals

Output signals: approximately +24V

Maximum current: 1A

The timing of the drive signals for drawers 1 and 2 can be controlled via software using the **ESC p m n1 n2** with the following parameters:

m = 0 drive signal pin 2

m = 1 drive signal pin 5

n1 x 2 msec defines the ON timing (for details refer to the SW commands)

n2 x 2 msec defines the OFF timing.

Warning:

To prevent an overcurrent condition, the drawer solenoid must have a resistance of 24 Ohms or greater.

Note:

- To connect the drawer, use a shielded cable.
- The two drive transistors should not be energized simultaneously. Use pin 4 to power the drawer.
- The resistance of the drawer solenoid must not be below the specified value otherwise an overcurrent could damage this component.

3.4 Software components and tools

The software includes the following components:

- **Printer Driver:** Standard Windows printer driver.
- **Opos:** A standard component that enables other components to use the printer. It includes:
 - Opos for POS printers
 - Opos for Cash Drawer
 - Opos for Line Display
- **Tool Kit:** A set of utilities required for printer management. It includes:
 - Firmware downloader
 - Setup configurator
 - Logo downloader
 - Memory maintenance
- **POS-RKserver:** DCOM component (to drive and program the printer remotely using the Resource Kit).
- **Demo:** Demo program
- **Installation Kit:** for installing the program.

3.5 Main functional modules

The printer is made up of the following main modules:

- Printing module
- Cutter
- Main board
- Slot-pluggable interface
- External power supply

3.5.1 Printing module

The thermal printer module prints directly on thermal paper. It is equipped with a single 72 mm optimized thermal print head with the following characteristics:

- | | |
|---------------------------|------------------------|
| - Heat Element Structure | 2 Heaters/dot |
| - Number of Heat Elements | 576 dots |
| - Heat Element Pitch | 0.125 mm (8.0 dots/mm) |
| - Print Width | 72 mm + 0.2 mm |

It prints horizontally at 203 dpi (8 dots/mm).

The printing module has the following electronic sensors:

- **Near end of paper**
 - Detection method: microswitch
 - Almost out of paper detection adjustment: Via adjustment lever
When the diameter of the paper on the roll is nearly reaching the core, the sensor detects the almost out of paper condition and lights up a yellow LED on the operator console. If the sensor is enabled (by ESC c 4), printing is interrupted.
 - o Suggested paper roll core diameter is:
 - internal 12.7 mm (0.5")
 - external 17.7 mm (0.7")

- **Paper detection sensor**
 - Detection method: photosensor
 - The paper detection sensor is installed on the paper path and detects the presence of the paper when its light rays are beamed back by the paper installed. This photosensor is adjusted via console (refer to the adjustment procedure).
The flashing of a yellow LED on the operator console signals the out of paper condition.
- **Cover Open**
 - Detection method: photosensor

This sensor automatically interrupts printing when the cover is opened. Close the cover to restore the normal operating conditions.

3.5.2 Cutter

- Cutting method: rotating blades.
- Type of cut: partial (an uncut border of 3.5 mm remains on the right-hand side if the printer is installed horizontally, on the left-hand side if it installed vertically).
- The receipt can also be cut manually by the operator.

The cutter mechanism is equipped with a photosensor that detects the home position of the cutter blades when the printer is powered on and after the cutting of the receipt. If the cutter blades are not repositioned correctly to their home position, the red Error LED on the console will begin to flash.

3.5.3 Main board

- Slot interface: 16-bit bus
- CPU: 16 MHz H8S – 2633
- Programmable gate array: CPLD XILINX XC9536
- RAM Base: 64Kx16 byte
- Firmware: 1 M byte Flash (512 x 16)

3.5.4 Slot-pluggable interface

Four different interface boards can be installed on the printer:

1. Serial RS232 C (female 25 pin connector)
2. Serial RS232 C (female 9 pin connector) with RJ display connector
3. USB with RJ display connector
4. PARALLEL bi-directional

The printer automatically recognizes the type of interface installed.

3.5.5 External power supply

- Switching type
- Input voltage: 110 – 220 Vac
- Output voltage: 24 Vdc

3.6 Paper Specifications

Type of paper:	Thermal
Format	Paper roll
Roll diameter	Max 100 mm
Paper width	80 $\pm$ 0.5 mm (3.15") standard 58-60 $\pm$ 0.5 mm (2.26-2.36") optional
Paper thickness	60 to 90 μ m
Suggested paper types:	
• Monochrome thermal paper	KF50 Kanzan (paper thickness: 62 μ m) Manufacturer : Kanzaki Spezialpapiere GmbH (Germany)
• Dual-color thermal paper	PD 750R (paper thickness: 75 μ m) Manufacturer: OJI Paper Mfg. Co. Ltd

Note:

To avoid damaging the print head and obtain an optimum print quality, it is suggested to use the thermal paper specified above or an equivalent type.

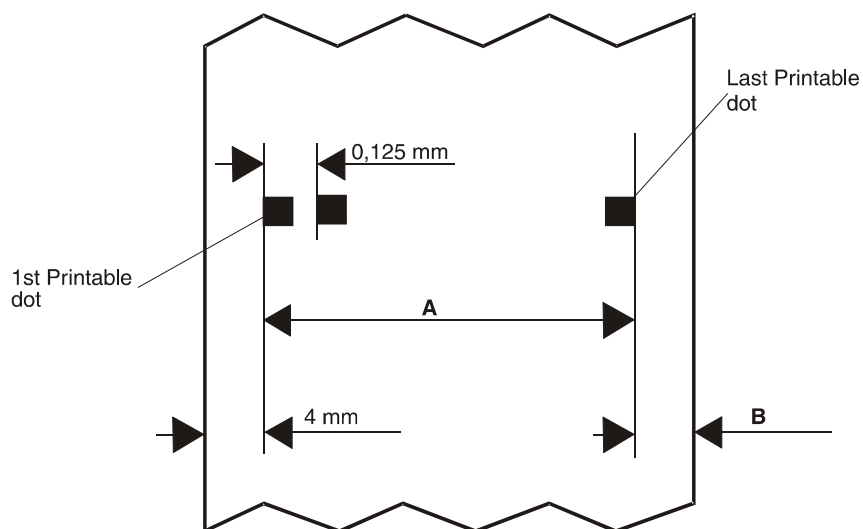
Dual-color printing can be obtained in two ways when using the dual-color thermal paper, Via Set-up only.

3.7 Print specification

Printing method	Direct thermal
Printing resolution	203 x 203 dpi (8 dot x mm)
Basic line feed	203" (1 step)
Colors	1 / 2
Max. printing speed	200 mm/sec
Duty cycle	30% for a receipt length up to 300mm
Fonts	10 x 19 / 13 x 27
Characters per inch	20 cpi (10 x 19 font B) / 15 cpi (13 x 27 font A)
Character size	1.26 x 2.39 mm / 1.69 x 3.38 mm (W x H)
Character sets	95 alphanumeric, 37 international, 128 x 10 graphic symbols
Data buffer	4 KB or 45 bytes
User Flash memory	384 KB
Max. no. of user logotypes	8192 (restricted to the memory available, 384 Kbytes)
Logotype resolution	Emulation: 180 x 180 dpi (printing 203 x 203 dpi)
Max. printing field	72 mm / 576 dots
Max. paper width	80 mm
Max. paper roll diameter	100 mm

3.7.1 Printable area

Paper width (mm)	Fonts	Chars per line	Dots per line	Right margin (B ± 0.5 mm)	Printable area (A ± 0.5 mm)
80	Font A (11+2)	42	546	7.7	68.3
	Font B (9 + 1)	56	560	6	70.0
	BIM		512	10	64.0
60	Font A (11+2)	32	416	4	52.0
	Font B (9 + 1)	42	420	3.5	52.5
	BIM		384	8	48.0
58	Font A (11+2)	30	390	5.3	48.7
	Font B (9 + 1)	40	400	4	50.0
	BIM		360		45.0



NOTE: To improve the reliability of the print head, the printable area shifts one dot horizontally for each receipt that is automatically cut.

This automatic shift feature is normally enabled but becomes disabled when the line length parameter is set to 43/57.

After 8 receipts cut automatically, the total displacement of the printable area will be 1 mm.

Upon completion of the 8 receipts, the printable area (1st printable dot) starts again from the original position (left margin = 4 mm).

3.7.2 Character specifications

- **Number of characters**

Alphanumeric characters 95

International characters 37

- **Character structure**

Font A (11+2) 13 (columns) x 27 (lines)

Font B (9 + 1) 10 (columns) x 19 (lines)

The font to be used can be selected by means of a specific line command (**Esc \$ f N**) or by choosing the related Setup option.

- **Character size**

Font A W 1.692 mm H 3.384 mm

Font B W 1.269 mm H 2.397 mm

3.7.3 Printing speed

Monochrome alphanumeric printing: 200 mm/sec

BIM up to 2" printing: 70 mm/sec

BIM more than 2" printing: 70 mm/sec

Note:

A slow transmission speed can be the cause of intermittent printing.

3.7.4 Character sets

In the character set, the firmware assigns a specific printable character to each byte of data. A character set may contain up to 255 different characters. The first 128 characters (from code 0 to 127) are standardized and represent the USA ASCII character set, which excludes all the European national characters and semigraphic symbols as well.

The assignment of codes 128 to 255 varies from one country to another, from one type of hardware to another, from one operating system to another and often according to the application program used. Before selecting a character set, read the documentation provided with your operating system and application carefully.

The section "Printable character set tables" indicates the codes that correspond to the characters in the resident character sets.

3.7.5 Printable character sets

The printer recognizes and can print the following character sets, selected as follows:

Character sets

Code Page 210 (Greek)

Code Page 437

(U.S.A., Standard Europe)

Code Page 850 (Multilingual)

Code Page 852 (Latin 2)

Code Page 857 (Turkish)

Code Page 858 (Multilingual + Euro))

Code Page 860 (Portuguese)

Code Page 862 (Israel)

Code Page 863 (Canadian-French)

Code Page 864 (Arabic)

Code Page 865 (Nordic)

Code Page 866 (Cyrillic)

WPC1251 (Cyrillic)

WPC1252 (Latin I)

WPC1253 (Greek)

WPC1254 (Turkish)

WPC1255 (Israel)

WPC1257 (Baltic)

Code Page 255 (Space Page)

National variants

Selection

via setup (NATION CODEPAGES: CP 210)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 437)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 850)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 852)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 857)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 858)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 860)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 862)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 863)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 864)

or via software (see ESC t n)

via setup (NATION CODEPAGES : CP 865)

or via software (see ESC t n)

via setup (NATION CODEPAGES: CP 866)

or via software (see ESC t n)

via setup (NATION CODEPAGES: WPC1251)

or via software (see ESC t n)

via setup (NATION CODEPAGES: WPC1252)

or via software (see ESC t n)

via setup (NATION CODEPAGES: WPC1253)

or via software (see ESC t n)

via setup (NATION CODEPAGES: WPC1254)

or via software (see ESC t n)

via setup (NATION CODEPAGES: WPC1255)

or via software (see ESC t n)

via setup (NATION : CODEPAGES WPC1257)

or via software (see ESC t n)

only via software (see ESC t n).

only via software (see ESC R n).

3.7.6 Printable character set tables

3.7.6.1 Codepage 210 (Greek)

MSB	LSB	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	! 33	" 34	# 35	\$ 36	% 37	& 38	' 39	(40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47
30	0011	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	8 56	9 57	: 58	; 59	< 60	= 61	> 62	? 63
40	0100	@ 64	A 65	B 66	C 67	D 68	E 69	F 70	G 71	H 72	I 73	J 74	K 75	L 76	M 77	N 78	O 79
50	0101	P 80	Q 81	R 82	S 83	T 84	U 85	V 86	W 87	X 88	Y 89	Z 90	[91	\ 92	] 93	^ 94	_ 95
60	0110	` 96	a 97	b 98	c 99	d 100	e 101	f 102	g 103	h 104	i 105	j 106	k 107	l 108	m 109	n 110	o 111
70	0111	p 112	q 113	r 114	s 115	t 116	u 117	v 118	w 119	x 120	y 121	z 122	{ 123	 124	} 125	~ 126	<u>DEL</u> 127
80	1000	A 128	B 129	Γ 130	Δ 131	E 132	Z 133	H 134	Θ 135	I 136	K 137	Λ 138	M 139	N 140	Ξ 141	Ο 142	Π 143
90	1001	P 144	Σ 145	T 146	Υ 147	Φ 148	X 149	Ψ 150	Ω 151	α 152	β 153	γ 154	δ 155	ε 156	ζ 157	η 158	θ 159
A0	1010	ι 160	κ 161	λ 162	μ 163	ν 164	ξ 165	ο 166	π 167	ρ 168	σ 169	ς 170	τ 171	υ 172	φ 173	χ 174	ψ 175
B0	1011	⌚ 176	⌚ 177	⌚ 178	 179	 180	 181	 182	 183	 184	 185	 186	 187	 188	 189	 190	 191
C0	1100	⌚ 192	⌚ 193	⌚ 194	⌚ 195	— 196	† 197	‡ 198	 199	ℒ 200	℞ 201	ℒ ₂ 202	⌚ 203	 204	= 205	⌚ 206	⌚ 207
D0	1101	⌚ 208	⌚ 209	⌚ 210	⌚ 211	⌚ 212	℞ 213	℞ 214	⌚ 215	† 216	℞ 217	℞ 218	⌚ 219	■ 220	⌚ 221	⌚ 222	■ 223
E0	1110	ω 224	α 225	ε 226	η 227	ι 228	ι 229	ο 230	υ 231	υ 232	ω 233	Α 234	Ε 235	Η 236	Ι 237	Ο 238	Υ 239
F0	1111	Ω 240	± 241	≥ 242	≤ 243	∫ 244	∫ 245	÷ 246	≈ 247	° 248	£ 249	• 250	√ 251	² 252	² 253	■ 254	<u>NBSP</u> 255

3.7.6.2 Codepage 437 (International)

MSB \ LSB	00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001 NUL 0	0010 STX 1	0011 SOT 2	0100 ETX 3	0101 EOT 4	0110 ENQ 5	0111 ACK 6	1000 BEL 7	1001 BS 8	1010 HT 9	1011 LF 10	1100 VT 11	1101 FF 12	1110 CR 13	1111 SO 14	SI 15
10	0001 DLE 16	0010 DC1 17	0011 DC2 18	0100 DC3 19	0101 DC4 20	0110 NAK 21	0111 SYN 22	1000 ETB 23	1001 CAN 24	1010 EM 25	1011 SUB 26	1100 ESC 27	1101 FS 28	1110 GS 29	1111 RS 30	US 31
20	0010 SP 32	0011 ! 33	0100 " 34	0101 # 35	0110 \$ 36	0111 % 37	1000 & 38	1001 ' 39	1010 (40	1011) 41	1100 * 42	1101 + 43	1110 , 44	1111 - 45	. 46	/ 47
30	0011 0 48	0100 1 49	0101 2 50	0110 3 51	0111 4 52	1000 5 53	1001 6 54	1010 7 55	1011 8 56	1100 9 57	1101 : 58	1110 ; 59	1111 < 60	= 61	> 62	? 63
40	0100 @ 64	0101 A 65	0110 B 66	0111 C 67	1000 D 68	1001 E 69	1010 F 70	1011 G 71	1100 H 72	1101 I 73	1110 J 74	1111 K 75	L 76	M 77	N 78	O 79
50	0101 P 80	0110 Q 81	0111 R 82	1000 S 83	1001 T 84	1010 U 85	1011 V 86	1100 W 87	1101 X 88	1110 Y 89	1111 Z 90	[91	\ 92	] 93	^ 94	_ 95
60	0110 , 96	0111 a 97	1000 b 98	1001 c 99	1010 d 100	1011 e 101	1100 f 102	1101 g 103	1110 h 104	1111 i 105	{ 106	 107	} 108	~ 109	n 110	o 111
70	0111 p 112	1000 q 113	1001 r 114	1010 s 115	1011 t 116	1100 u 117	1101 v 118	1110 w 119	1111 x 120	{ 121	 122	} 123	~ 124	DEL 125	DEL 126	DEL 127
80	1000 Ç 128	1001 ü 129	1010 é 130	1011 â 131	1100 ä 132	1101 à 133	1110 å 134	1111 ç 135	1111 ë 136	1111 è 137	1111 é 138	1111 î 139	1111 ï 140	1111 ì 141	1111 Å 142	1111 Å 143
90	1001 É 144	1010 æ 145	1011 Æ 146	1100 ø 147	1101 ö 148	1110 ò 149	1111 û 150	1111 ù 151	1111 ý 152	1111 ÿ 153	1111 Û 154	1111 Ü 155	1111 £ 156	1111 ¥ 157	1111 ₹ 158	1111 f 159
A0	1010 á 160	1011 í 161	1100 ó 162	1101 ú 163	1110 ñ 164	1111 Ñ 165	1111 ª 166	1111 º 167	1111 ¿ 168	1111 ¬ 169	1111 ¬ 170	1111 ¼ 171	1111 ½ 172	1111 ¾ 173	1111 « 174	1111 » 175
B0	1011 ▯ 176	1100 ▯ 177	1101 ▯ 178	1110 ▯ 179	1111 ▯ 180	1111 ▯ 181	1111 ▯ 182	1111 ▯ 183	1111 ▯ 184	1111 ▯ 185	1111 ▯ 186	1111 ▯ 187	1111 ▯ 188	1111 ▯ 189	1111 ▯ 190	1111 ▯ 191
C0	1100 L 192	1101 L 193	1110 T 194	1111 T 195	1111 T 196	1111 T 197	1111 T 198	1111 T 199	1111 L 200	1111 F 201	1111 L 202	1111 T 203	1111 F 204	1111 =	1111 F	1111 L
D0	1101 L 208	1110 T 209	1111 T 210	1111 L 211	1111 L 212	1111 F 213	1111 F 214	1111 F 215	1111 F 216	1111 J 217	1111 J 218	1111 J 219	1111 J 220	1111 J 221	1111 J 222	1111 J 223
E0	1110 α 224	1111 β 225	1111 Γ 226	1111 Π 227	1111 Σ 228	1111 σ 229	1111 μ 230	1111 τ 231	1111 Φ 232	1111 Θ 233	1111 Ω 234	1111 δ 235	1111 ∞ 236	1111 φ 237	1111 ε 238	1111 Π 239
F0	1111 ≡ 240	1111 ± 241	1111 ≥ 242	1111 ≤ 243	1111 ↑ 244	1111 ↓ 245	1111 ÷ 246	1111 ≈ 247	1111 ° 248	1111 · 249	1111 · 250	1111 √ 251	1111 π 252	1111 ² 253	1111 ■ 254	1111 NBSP 255

3.7.6.3 Codepage 850 (Multilingual)

MSB	LSB	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	! 33	" 34	# 35	\$ 36	% 37	& 38	' 39	(40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47
30	0011	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	8 56	9 57	: 58	; 59	< 60	= 61	> 62	? 63
40	0100	@ 64	A 65	B 66	C 67	D 68	E 69	F 70	G 71	H 72	I 73	J 74	K 75	L 76	M 77	N 78	O 79
50	0101	P 80	Q 81	R 82	S 83	T 84	U 85	V 86	W 87	X 88	Y 89	Z 90	[91	\ 92	] 93	^ 94	<u> </u> 95
60	0110	` 96	a 97	b 98	c 99	d 100	e 101	f 102	g 103	h 104	i 105	j 106	k 107	l 108	m 109	n 110	o 111
70	0111	p 112	q 113	r 114	s 115	t 116	u 117	v 118	w 119	x 120	y 121	z 122	{ 123	 124	} 125	~ 126	<u>DEL</u> 127
80	1000	Ç 128	ü 129	é 130	â 131	ä 132	à 133	å 134	ç 135	ê 136	ë 137	è 138	ì 139	í 140	î 141	ï 142	Ä 143
90	1001	É 144	æ 145	Æ 146	ö 147	ö 148	ò 149	û 150	ÿ 151	Û 152	Ö 153	Ü 154	ø 155	£ 156	Ø 157	× 158	f 159
A0	1010	á 160	í 161	ó 162	ú 163	ñ 164	Ñ 165	ª 166	º 167	¿ 168	® 169	¬ 170	¾ 171	¼ 172	¿ 173	« 174	» 175
B0	1011	▨ 176	▩ 177	▪ 178	 179	┐ 180	Á 181	Â 182	Ã 183	Ä 184	Å 185	☺ 186	☹ 187	☺ 188	☹ 189	¥ 190	₯ 191
C0	1100	Ł 192	ł 193	Ť 194	ť 195	— 196	† 197	ã 198	ä 199	ℓ 200	ℝ 201	℥ 202	₣ 203	₤ 204	= 205	₧ 206	¤ 207
D0	1101	Š 208	Đ 209	Ê 210	Ě 211	È 212	ı 213	Í 214	İ 215	İ 216	Ј 217	Г 218	■ 219	■ 220	ı 221	İ 222	■ 223
E0	1110	Ó 224	ß 225	Õ 226	Ò 227	ø 228	Õ 229	µ 230	þ 231	ƒ 232	ú 233	Û 234	Ü 235	ý 236	Ý 237	— 238	‘ 239
F0	1111	— 240	± 241	= 242	¾ 243	℥ 244	₯ 245	÷ 246	„ 247	° 248	… 249	• 250	• 251	• 252	• 253	■ 254	<u>NBSP</u> 255

3.7.6.4 Codepage 852 (Latin 2)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	Ç	ü	é	â	ä	û	ć	ç	ł	ë	ő	í	ź	Ą	ć	ć
90	1001	É	Í	Í	ö	ö	Ł	Ł	Ś	Ś	Ö	Ü	Ť	ť	Ł	×	Č
A0	1010	á	í	ó	ú	Ą	ą	Ž	ž	Ę	ę	¬	ž	Č	Ś	«	»
B0	1011	■	■	■		┐	Á	Ā	Ē	Š	Ŧ		Ŧ	Ŧ	Ž	Ž	Ŧ
C0	1100	Ł	Ł	Ŧ	┐	—	┐	Ā	ā	Ł	Ŧ	Ŧ	Ŧ	Ŧ	=	Ŧ	»
D0	1101	đ	Đ	Ď	Ě	ď	Ň	í	ĭ	ě	Ĵ	Ŧ	■	■	Ŧ	Ŧ	■
E0	1110	Ó	ß	Ō	Ň	ń	ň	š	š	Ř	Ú	ř	Ů	ý	ý	č	‘
F0	1111	—	“	„	˘	˘	š	÷	„	°	“	•	ú	ř	č	■	<u>NBSP</u> 255

3.7.6.5 Codepage 857 (Turkish)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ì	í	î	ÿ	Ä
90	1001	É	æ	Æ	ö	ö	ö	ü	ü	İ	Ö	Ü	ø	£	ı	ı	Ş
A0	1010	á	í	ó	ú	ñ	Ñ	Ğ	ğ	ı	®	¬	™	™	ı	«	»
B0	1011	■	■	■		ı	Á	Â	À	©	¶	¶	¶	¶	¶	¥	Œ
C0	1100	Ł	ł	Ť	ť	—	†	ã	Ä	Ł	Ŧ	Ŧ	Ŧ	Ŧ	=	†	»
D0	1101	°	ª	Ê	È	È		Í	Î	İ	Ĵ	Ĵ	■	■	ı	ı	■
E0	1110	Ó	ß	Õ	Ò	ö	Ö	µ		×	Ú	Û	Ü	ì	ý	—	‘
F0	1111	—	±		¾	¶	§	÷	„	°	“	•	•	•	•	■	<u>NBSP</u> 255

3.7.6.6 Codepage 858 (Multilingual Latin I + Euro)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ì	í	î	Ë	Å
90	1001	É	æ	Æ	ö	ö	ò	ù	û	ÿ	Ö	Ü	ø	é	Ø	×	f
A0	1010	á	í	ó	ú	ñ	Ñ	ª	º	¿	®	¬	£	¼	½	¾	»
B0	1011	■	■	■		†	Á	Â	À	©	¶		¶	¶	¶	¥	¶
C0	1100	L	┐	T	└	—	†	ã	Ä	ℓ	ℓ	ℓ	ℓ	ℓ	=	ℓ	»
D0	1101	ö	Ð	Ê	È	€	Í	Î	Ï	J	Γ	■	■	■	■	■	■
E0	1110	Ó	ß	Õ	Ò	ø	Ö	µ	þ	£	Ú	Û	Ü	Ý	Ý	—	‘
F0	1111	—	±	=	¾	¶	§	÷	„	°	„	•	•	•	•	■	<u>NBSP</u> 255

3.7.6.7 Codepage 860 (Portuguese)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOI</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENO</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	! 33	" 34	# 35	\$ 36	% 37	& 38	' 39	(40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47
30	0011	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	8 56	9 57	: 58	; 59	< 60	= 61	> 62	? 63
40	0100	@ 64	A 65	B 66	C 67	D 68	E 69	F 70	G 71	H 72	I 73	J 74	K 75	L 76	M 77	N 78	O 79
50	0101	P 80	Q 81	R 82	S 83	T 84	U 85	V 86	W 87	X 88	Y 89	Z 90	[91	\ 92	] 93	^ 94	<u>95</u> 95
60	0110	` 96	a 97	b 98	c 99	d 100	e 101	f 102	g 103	h 104	i 105	j 106	k 107	l 108	m 109	n 110	o 111
70	0111	p 112	q 113	r 114	s 115	t 116	u 117	v 118	w 119	x 120	y 121	z 122	{ 123	 124	} 125	~ 126	<u>DEL</u> 127
80	1000	Ç 128	ü 129	é 130	ã 131	ä 132	à 133	Á 134	ç 135	ë 136	Ê 137	è 138	Í 139	Ô 140	ì 141	Ã 142	Ä 143
90	1001	É 144	À 145	È 146	Ö 147	Õ 148	ò 149	Ú 150	ù 151	Ì 152	Ï 153	Û 154	Ô 155	£ 156	Ù 157	Ř 158	Ó 159
A0	1010	á 160	í 161	ó 162	ú 163	ñ 164	Ñ 165	ª 166	º 167	¿ 168	Ò 169	¬ 170	¼ 171	½ 172	¾ 173	« 174	» 175
B0	1011	▯ 176	▯ 177	▯ 178	 179	 180	 181	 182	 183	 184	 185	 186	 187	 188	 189	 190	 191
C0	1100	┐ 192	┐ 193	┐ 194	┐ 195	┐ 196	┐ 197	┐ 198	┐ 199	┐ 200	┐ 201	┐ 202	┐ 203	┐ 204	┐ 205	┐ 206	┐ 207
D0	1101	┐ 208	┐ 209	┐ 210	┐ 211	┐ 212	┐ 213	┐ 214	┐ 215	┐ 216	┐ 217	┐ 218	┐ 219	┐ 220	┐ 221	┐ 222	┐ 223
E0	1110	α 224	β 225	Γ 226	Π 227	Σ 228	σ 229	μ 230	τ 231	Φ 232	Θ 233	Ω 234	δ 235	∞ 236	φ 237	ε 238	Π 239
F0	1111	≡ 240	± 241	≥ 242	≤ 243	∫ 244	∫ 245	÷ 246	≈ 247	° 248	● 249	· 250	√ 251	π 252	² 253	■ 254	<u>NBSP</u> 255

3.7.6.8 Codepage 862 (Hebrew)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע
90	1001	פ	צ	ק	ר	ש	ת	י	כ	ל	מ	נ	ס	ע	פ	צ	ק
A0	1010	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע
B0	1011	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע
C0	1100	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע
D0	1101	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע
E0	1110	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע
F0	1111	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	ע

3.7.6.9 Codepage 863 (Canadian-French)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	Ç	ù	é	ä	Å	à	¶	ç	ë	è	è	ï	î	—	À	Š
90	1001	É	È	Ê	ø	Ê	Ï	□	Õ	ÿ	Ö	Ü	¢	£	Ù	Û	f
A0	1010		í	ó	ú	ñ	Ñ	ª	º	¿	¬	¬	¼	½	¾	«	»
B0	1011	▤	▥	▦													
C0	1100	L	L	T	T	—	+	+	+	L	¶	¶	¶	¶	=	+	+
D0	1101	L	T	T	L	L	F	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
E0	1110	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	π
F0	1111	≡	±	≥	≤	∫	∫	÷	≈	°	•	•	√	n	z	■	<u>NBSP</u> 255

3.7.6.10 Codepage 864 (Arabic)

MSB	00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	<u>SP</u> 32	<u>!</u> 33	<u>"</u> 34	<u>#</u> 35	<u>\$</u> 36	<u>%</u> 37	<u>&</u> 38	<u>'</u> 39	<u>(</u> 40	<u>)</u> 41	<u>*</u> 42	<u>+</u> 43	<u>,</u> 44	<u>-</u> 45	<u>.</u> 46	<u>/</u> 47
30	<u>0</u> 48	<u>1</u> 49	<u>2</u> 50	<u>3</u> 51	<u>4</u> 52	<u>5</u> 53	<u>6</u> 54	<u>7</u> 55	<u>8</u> 56	<u>9</u> 57	<u>:</u> 58	<u>;</u> 59	<u><</u> 60	<u>=</u> 61	<u>></u> 62	<u>?</u> 63
40	<u>@</u> 64	<u>A</u> 65	<u>B</u> 66	<u>C</u> 67	<u>D</u> 68	<u>E</u> 69	<u>F</u> 70	<u>G</u> 71	<u>H</u> 72	<u>I</u> 73	<u>J</u> 74	<u>K</u> 75	<u>L</u> 76	<u>M</u> 77	<u>N</u> 78	<u>O</u> 79
50	<u>P</u> 80	<u>Q</u> 81	<u>R</u> 82	<u>S</u> 83	<u>T</u> 84	<u>U</u> 85	<u>V</u> 86	<u>W</u> 87	<u>X</u> 88	<u>Y</u> 89	<u>Z</u> 90	<u>[</u> 91	<u>\</u> 92	<u>]</u> 93	<u>^</u> 94	<u>_</u> 95
60	<u>`</u> 96	<u>a</u> 97	<u>b</u> 98	<u>c</u> 99	<u>d</u> 100	<u>e</u> 101	<u>f</u> 102	<u>g</u> 103	<u>h</u> 104	<u>i</u> 105	<u>j</u> 106	<u>k</u> 107	<u>l</u> 108	<u>m</u> 109	<u>n</u> 110	<u>o</u> 111
70	<u>p</u> 112	<u>q</u> 113	<u>r</u> 114	<u>s</u> 115	<u>t</u> 116	<u>u</u> 117	<u>v</u> 118	<u>w</u> 119	<u>x</u> 120	<u>y</u> 121	<u>z</u> 122	<u>{</u> 123	<u> </u> 124	<u>}</u> 125	<u>~</u> 126	<u>DEL</u> 127
80	<u>°</u> 128	<u>•</u> 129	<u>•</u> 130	<u>√</u> 131	<u>⋮</u> 132	<u>—</u> 133	<u> </u> 134	<u>+</u> 135	<u>+</u> 136	<u>+</u> 137	<u>+</u> 138	<u>+</u> 139	<u>+</u> 140	<u>+</u> 141	<u>+</u> 142	<u>+</u> 143
90	<u>β</u> 144	<u>∞</u> 145	<u>ø</u> 146	<u>±</u> 147	<u>½</u> 148	<u>¼</u> 149	<u>≈</u> 150	<u>«</u> 151	<u>»</u> 152	<u>لا</u> 153	<u>ي</u> 154			<u>لا</u> 157	<u>ي</u> 158	<u>ع</u> 159
A0		<u>-</u> 161	<u>ل</u> 162	<u>£</u> 163	<u>⊠</u> 164	<u>ل</u> 165			<u>ل</u> 168	<u>ب</u> 169	<u>ت</u> 170	<u>ث</u> 171	<u>،</u> 172	<u>ج</u> 173	<u>ح</u> 174	<u>خ</u> 175
B0	<u>•</u> 176	<u>،</u> 177	<u>ي</u> 178	<u>ي</u> 179	<u>ع</u> 180	<u>و</u> 181	<u>ف</u> 182	<u>ي</u> 183	<u>ل</u> 184	<u>ا</u> 185	<u>ف</u> 186	<u>؛</u> 187	<u>س</u> 188	<u>ش</u> 189	<u>ص</u> 190	<u>؟</u> 191
C0	<u>ف</u> 192	<u>ء</u> 193	<u>ا</u> 194	<u>ا</u> 195	<u>و</u> 196	<u>ع</u> 197	<u>ك</u> 198	<u>ا</u> 199	<u>ب</u> 200	<u>ة</u> 201	<u>ت</u> 202	<u>ث</u> 203	<u>ج</u> 204	<u>ح</u> 205	<u>خ</u> 206	<u>د</u> 207
D0	<u>ذ</u> 208	<u>ر</u> 209	<u>ز</u> 210	<u>س</u> 211	<u>ش</u> 212	<u>ص</u> 213	<u>ض</u> 214	<u>ط</u> 215	<u>ظ</u> 216	<u>ع</u> 217	<u>غ</u> 218	<u>ا</u> 219	<u>ا</u> 220	<u>÷</u> 221	<u>x</u> 222	<u>ع</u> 223
E0	<u>—</u> 224	<u>ف</u> 225	<u>ق</u> 226	<u>ك</u> 227	<u>ل</u> 228	<u>م</u> 229	<u>ن</u> 230	<u>ه</u> 231	<u>و</u> 232	<u>ي</u> 233	<u>ي</u> 234	<u>ص</u> 235	<u>ف</u> 236	<u>غ</u> 237	<u>غ</u> 238	<u>م</u> 239
F0	<u>ـ</u> 240	<u>ـ</u> 241	<u>ن</u> 242	<u>ه</u> 243	<u>ع</u> 244	<u>ب</u> 245	<u>ب</u> 246	<u>ف</u> 247	<u>ق</u> 248	<u>لا</u> 249	<u>لا</u> 250	<u>ل</u> 251	<u>ك</u> 252	<u>ي</u> 253	<u>■</u> 254	

3.7.6.11 Codepage 865 (Nordic)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	Ç	ù	é	ä	à	å	ç	ë	è	é	ì	í	î	Ë	Ä	Å
90	1001	É	æ	Æ	ö	ø	û	ü	ÿ	Ö	Ü	ø	£	Ø	ƒ	f	159
A0	1010	á	í	ó	ú	ñ	Ñ	ª	º	¿	¬	½	¾	¿	«	»	175
B0	1011	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C0	1100	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D0	1101	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E0	1110	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F0	1111	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	<u>NBSP</u> 255

3.7.6.12 Codepage 866 (Russian)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	! 33	" 34	# 35	\$ 36	% 37	& 38	' 39	(40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47
30	0011	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	8 56	9 57	: 58	; 59	< 60	= 61	> 62	? 63
40	0100	@ 64	A 65	B 66	C 67	D 68	E 69	F 70	G 71	H 72	I 73	J 74	K 75	L 76	M 77	N 78	O 79
50	0101	P 80	Q 81	R 82	S 83	T 84	U 85	V 86	W 87	X 88	Y 89	Z 90	[91	\ 92	] 93	^ 94	_ 95
60	0110	` 96	a 97	b 98	c 99	d 100	e 101	f 102	g 103	h 104	i 105	j 106	k 107	l 108	m 109	n 110	o 111
70	0111	p 112	q 113	r 114	s 115	t 116	u 117	v 118	w 119	x 120	y 121	z 122	{ 123	 124	} 125	~ 126	<u>DEL</u> 127
80	1000	A 128	B 129	B 130	Г 131	Д 132	E 133	Ж 134	З 135	И 136	Й 137	К 138	Л 139	М 140	Н 141	О 142	П 143
90	1001	P 144	C 145	T 146	У 147	Ф 148	X 149	Ц 150	Ч 151	Ш 152	Щ 153	Ъ 154	Ы 155	Ь 156	Э 157	Ю 158	Я 159
A0	1010	a 160	б 161	В 162	Г 163	Д 164	e 165	Ж 166	З 167	И 168	Й 169	К 170	Л 171	М 172	Н 173	О 174	П 175
B0	1011	▒ 176	▓ 177	░ 178	 179	┐ 180	└ 181	┌ 182	└ 183	┐ 184	┌ 185	┐ 186	└ 187	┌ 188	└ 189	┌ 190	└ 191
C0	1100	┌ 192	└ 193	┐ 194	└ 195	┐ 196	└ 197	┐ 198	└ 199	┐ 200	└ 201	┐ 202	└ 203	┐ 204	= 205	└ 206	┐ 207
D0	1101	┌ 208	└ 209	┐ 210	└ 211	┐ 212	└ 213	┐ 214	└ 215	┐ 216	└ 217	┐ 218	▀ 219	▀ 220	▀ 221	▀ 222	▀ 223
E0	1110	Р 224	С 225	Т 226	У 227	Ф 228	Х 229	Ц 230	Ч 231	Ш 232	Щ 233	Ъ 234	Ы 235	Ь 236	Э 237	Ю 238	Я 239
F0	1111	Ё 240	ё 241	Є 242	е 243	İ 244	ı 245	Ÿ 246	ÿ 247	° 248	· 249	· 250	√ 251	№ 252	« 253	■ 254	<u>NSP</u> 255

3.7.6.13 Codepage WPC 1251 (Cyrillic)

MSB \ LSB		00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	Ђ	Ѓ	Ѕ	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї
90	1001	Ђ	Ѓ	Ѕ	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї
A0	1010	<u>NSP</u> 160	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї
B0	1011	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї	Ї
C0	1100	А	В	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
D0	1101	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
E0	1110	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
F0	1111	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я

Gray cells are undefined (print a space).

3.7.6.14 Codepage WPC 1252 (Latin I)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	€ 128		ƒ 130	f 131	„ 132	… 133	† 134	‡ 135	ˆ 136	% 137	š 138	< 139	œ 140		ž 142	
90	1001		˘ 145	ı 146	ˆ 147	“ 148	• 149	— 150	— 151	˜ 152	™ 153	š 154	> 155	œ 156		ž 158	ÿ 159
A0	1010	<u>NEBP</u> 160	ı 161	¢ 162	£ 163	¤ 164	¥ 165	ı 166	§ 167	¨ 168	© 169	ª 170	« 171	¬ 172	– 173	® 174	— 175
B0	1011	° 176	± 177	² 178	³ 179	´ 180	µ 181	¶ 182	· 183	¸ 184	¹ 185	º 186	» 187	¼ ₄ 188	½ ₂ 189	¾ ₄ 190	¿ 191
C0	1100	À 192	Á 193	Â 194	Ã 195	Ä 196	Å 197	Æ 198	Ç 199	È 200	É 201	Ê 202	Ë 203	Ì 204	Í 205	Î 206	Ï 207
D0	1101	Ð 208	Ñ 209	Ò 210	Ó 211	Ô 212	Õ 213	Ö 214	× 215	Ø 216	Ù 217	Ú 218	Û 219	Ü 220	Ý 221	Þ 222	ß 223
E0	1110	à 224	á 225	â 226	ã 227	ä 228	å 229	æ 230	ç 231	è 232	é 233	ê 234	ë 235	ì 236	í 237	î 238	ï 239
F0	1111	ö 240	ñ 241	ò 242	ó 243	ô 244	õ 245	ö 246	÷ 247	ø 248	ù 249	ú 250	û 251	ü 252	ý 253	þ 254	ÿ 255

Gray cells are undefined (print a space).

3.7.6.15 Codepage WPC 1253 (Greek)

MSB \ LSB		00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	! 33	" 34	# 35	\$ 36	% 37	& 38	' 39	(40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47
30	0011	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	8 56	9 57	: 58	; 59	< 60	= 61	> 62	? 63
40	0100	@ 64	A 65	B 66	C 67	D 68	E 69	F 70	G 71	H 72	I 73	J 74	K 75	L 76	M 77	N 78	O 79
50	0101	P 80	Q 81	R 82	S 83	T 84	U 85	V 86	W 87	X 88	Y 89	Z 90	[91	\ 92	] 93	^ 94	_ 95
60	0110	` 96	a 97	b 98	c 99	d 100	e 101	f 102	g 103	h 104	i 105	j 106	k 107	l 108	m 109	n 110	o 111
70	0111	p 112	q 113	r 114	s 115	t 116	u 117	v 118	w 119	x 120	y 121	z 122	{ 123	 124	} 125	~ 126	<u>DEL</u> 127
80	1000	€ 128		ƒ 130	ƒ 131	„ 132	… 133	† 134	‡ 135		‰ 137	< 138					
90	1001		ˆ 145	ˆ 146	ˆ 147	ˆ 148	• 149	— 150	— 151		™ 153	> 155					
A0	1010	<u>NBSP</u> 160	ˆ 161	ˆ 162	ˆ 163	ˆ 164	ˆ 165	ˆ 166	ˆ 167	ˆ 168	ˆ 169	ˆ 170	« 171	¬ 172	— 173	® 174	— 175
B0	1011	° 176	± 177	² 178	³ 179	´ 180	µ 181	¶ 182	· 183	ˆ 184	ˆ 185	ˆ 186	» 187	ˆ 188	ˆ 189	ˆ 190	ˆ 191
C0	1100	ˆ 192	ˆ 193	ˆ 194	ˆ 195	ˆ 196	ˆ 197	ˆ 198	ˆ 199	ˆ 200	ˆ 201	ˆ 202	ˆ 203	ˆ 204	ˆ 205	ˆ 206	ˆ 207
D0	1101	Π 208	Ρ 209		Σ 211	Τ 212	Υ 213	Φ 214	Χ 215	Ψ 216	Ω 217	ˆ 218	ˆ 219	ˆ 220	ˆ 221	ˆ 222	ˆ 223
E0	1110	ˆ 224	α 225	β 226	γ 227	δ 228	ε 229	ζ 230	η 231	θ 232	ι 233	κ 234	λ 235	μ 236	ν 237	ξ 238	ο 239
F0	1111	π 240	ρ 241	ς 242	σ 243	τ 244	υ 245	φ 246	χ 247	ψ 248	ω 249	ˆ 250	ˆ 251	ˆ 252	ˆ 253	ˆ 254	ˆ 255

Gray cells are undefined (print a space).

3.7.6.16 Codepage WPC 1254 (Turkish)

MSB \ LSB		00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	! 33	" 34	# 35	\$ 36	% 37	& 38	' 39	(40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47
30	0011	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	8 56	9 57	: 58	; 59	< 60	= 61	> 62	? 63
40	0100	@ 64	A 65	B 66	C 67	D 68	E 69	F 70	G 71	H 72	I 73	J 74	K 75	L 76	M 77	N 78	O 79
50	0101	P 80	Q 81	R 82	S 83	T 84	U 85	V 86	W 87	X 88	Y 89	Z 90	[91	\ 92	] 93	^ 94	_ 95
60	0110	` 96	a 97	b 98	c 99	d 100	e 101	f 102	g 103	h 104	i 105	j 106	k 107	l 108	m 109	n 110	o 111
70	0111	p 112	q 113	r 114	s 115	t 116	u 117	v 118	w 119	x 120	y 121	z 122	{ 123	 124	} 125	~ 126	<u>DEL</u> 127
80	1000	€ 128		ı 129	f 130	" 131	... 132	† 133	‡ 134	~ 135	% 136	Š 137	< 138	Œ 139			
90	1001		\ 144	/ 145	" 146	" 147	• 148	— 149	— 150	~ 151	™ 152	Š 153	> 154	œ 155			Ÿ 159
A0	1010	<u>NBSP</u> 160	ı 161	ı 162	£ 163	¤ 164	¥ 165	ı 166	ı 167	ı 168	ı 169	ı 170	ı 171	ı 172	ı 173	ı 174	ı 175
B0	1011	° 176	± 177	² 178	³ 179	´ 180	µ 181	¶ 182	· 183	¸ 184	¹ 185	º 186	» 187	¼ 188	½ 189	¾ 190	¿ 191
C0	1100	À 192	Á 193	Â 194	3 195	Ä 196	Å 197	Æ 198	Ç 199	È 200	É 201	Ê 202	Ë 203	Ì 204	Í 205	Î 206	Ï 207
D0	1101	Ğ 208	Ñ 209	Ò 210	Ó 211	Ö 212	Ö 213	Ö 214	× 215	Ø 216	Ù 217	Ú 218	Û 219	Ü 220	İ 221	Ş 222	ß 223
E0	1110	à 224	á 225	â 226	ã 227	ä 228	å 229	æ 230	ç 231	è 232	é 233	ê 234	ë 235	ì 236	í 237	î 238	ï 239
F0	1111	ğ 240	ñ 241	ò 242	ó 243	ô 244	õ 245	ö 246	÷ 247	ø 248	ù 249	ú 250	û 251	ü 252	ı 253	ş 254	ÿ 255

Gray cells are undefined (print a space).

3.7.6.17 Codepage WPC 1255 (Hebrew)

MSB \ LSB		00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	€ 128		ƒ 130	f 131	„ 132	… 133	† 134	‡ 135	~ 136	‰ 137		< 139				
90	1001		ˆ 145	˚ 146	˛ 147	˜ 148	• 149	— 150	— 151	~ 152	™ 153		> 155				
A0	1010	<u>NBSP</u> 160	ı 161	¢ 162	£ 163	¤ 164	¥ 165	¦ 166	§ 167	¨ 168	© 169	× 170	« 171	¬ 172	— 173	® 174	— 175
B0	1011	° 176	± 177	² 178	³ 179	´ 180	µ 181	¶ 182	· 183	¸ 184	¹ 185	÷ 186	» 187	¼ ₄ 188	½ ₂ 189	¾ ₃ 190	¿ 191
C0	1100		… 193	ˆ ₂ 194	ˆ ₃ 195	ˆ ₄ 196	ˆ ₅ 197	ˆ ₆ 198	ˆ ₇ 199	ˆ ₈ 200							
D0	1101	ı 208			ˆ ₁ 211	ˆ ₂ 212	ˆ ₃ 213	ˆ ₄ 214	ˆ ₅ 215	ˆ ₆ 216							
E0	1110	א 224	ב 225	ג 226	ד 227	ה 228	ו 229	ז 230	ח 231	ט 232	י 233	ך 234	כ 235	ל 236	ם 237	נ 238	ס 239
F0	1111	ך 240	ם 241	נ 242	ס 243	ע 244	פ 245	צ 246	ק 247	ר 248	ש 249	ת 250			<u>LTR</u> 253	<u>RTL</u> 254	

Gray cells are undefined (print a space).

3.7.6.18 Codepage 1257 (Baltic)

MSB \ LSB		00 0000	01 0001	02 0010	03 0011	04 0100	05 0101	06 0110	07 0111	08 1000	09 1001	0A 1010	0B 1011	0C 1100	0D 1101	0E 1110	0F 1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0011	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	0100	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	0101	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	0110	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	0111	p	q	r	s	t	u	v	w	x	y	z	{		}	~	<u>DEL</u> 127
80	1000	€ 128		ƒ 130		„ 132	… 133	† 134	‡ 135		‰ 137		< 139		“ 141	” 142	‡ 143
90	1001		ˆ 145	˜ 146	˘ 147	“ 148	• 149	— 150	— 151		™ 153		> 155		— 157	ˆ 158	
A0	1010	<u>NEBP</u> 160		¢ 162	£ 163	¤ 164		¡ 166	§ 167	ø 168	© 169	® 170	« 171	¬ 172	– 173	® 174	Æ 175
B0	1011	° 176	± 177	² 178	³ 179	´ 180	µ 181	¶ 182	· 183	ø 184	¹ 185	² 186	» 187	¼ ₄ 188	½ ₂ 189	¾ ₄ 190	æ 191
C0	1100	À 192	Á 193	Â 194	Ã 195	Ä 196	Å 197	Ê 198	Ë 199	Č 200	É 201	Ž 202	Ê 203	Ġ 204	Ķ 205	Ī 206	Ļ 207
D0	1101	Š 208	Ń 209	Ņ 210	Ó 211	Ô 212	Õ 213	Ö 214	× 215	Ū 216	Ł 217	Ś 218	Ū 219	Ų 220	Ž 221	Ž 222	ß 223
E0	1110	ą 224	ı 225	ā 226	č 227	ä 228	å 229	ę 230	ē 231	č 232	é 233	ž 234	ė 235	ġ 236	ķ 237	ī 238	ļ 239
F0	1111	š 240	ń 241	ņ 242	ó 243	ô 244	õ 245	ö 246	÷ 247	ų 248	ł 249	ś 250	ū 251	ų 252	ž 253	ž 254	• 255

Gray cells are undefined (print a space).

3.7.6.19 Codepage 255 (Space page)

MSB	LSB	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
00	0001	<u>NUL</u> 0	<u>STX</u> 1	<u>SOT</u> 2	<u>ETX</u> 3	<u>EOT</u> 4	<u>ENQ</u> 5	<u>ACK</u> 6	<u>BEL</u> 7	<u>BS</u> 8	<u>HT</u> 9	<u>LF</u> 10	<u>VT</u> 11	<u>FF</u> 12	<u>CR</u> 13	<u>SO</u> 14	<u>SI</u> 15
10	0001	<u>DLE</u> 16	<u>DC1</u> 17	<u>DC2</u> 18	<u>DC3</u> 19	<u>DC4</u> 20	<u>NAK</u> 21	<u>SYN</u> 22	<u>ETB</u> 23	<u>CAN</u> 24	<u>EM</u> 25	<u>SUB</u> 26	<u>ESC</u> 27	<u>FS</u> 28	<u>GS</u> 29	<u>RS</u> 30	<u>US</u> 31
20	0010	<u>SP</u> 32	<u>!</u> 33	<u>"</u> 34	<u>#</u> 35	<u>\$</u> 36	<u>%</u> 37	<u>&</u> 38	<u>'</u> 39	<u>(</u> 40	<u>)</u> 41	<u>*</u> 42	<u>+</u> 43	<u>,</u> 44	<u>-</u> 45	<u>.</u> 46	<u>/</u> 47
30	0011	<u>0</u> 48	<u>1</u> 49	<u>2</u> 50	<u>3</u> 51	<u>4</u> 52	<u>5</u> 53	<u>6</u> 54	<u>7</u> 55	<u>8</u> 56	<u>9</u> 57	<u>:</u> 58	<u>;</u> 59	<u><</u> 60	<u>=</u> 61	<u>></u> 62	<u>?</u> 63
40	0100	<u>@</u> 64	<u>A</u> 65	<u>B</u> 66	<u>C</u> 67	<u>D</u> 68	<u>E</u> 69	<u>F</u> 70	<u>G</u> 71	<u>H</u> 72	<u>I</u> 73	<u>J</u> 74	<u>K</u> 75	<u>L</u> 76	<u>M</u> 77	<u>N</u> 78	<u>O</u> 79
50	0101	<u>P</u> 80	<u>Q</u> 81	<u>R</u> 82	<u>S</u> 83	<u>T</u> 84	<u>U</u> 85	<u>V</u> 86	<u>W</u> 87	<u>X</u> 88	<u>Y</u> 89	<u>Z</u> 90	<u>[</u> 91	<u>\</u> 92	<u>]</u> 93	<u>^</u> 94	<u>_</u> 95
60	0110	<u>`</u> 96	<u>a</u> 97	<u>b</u> 98	<u>c</u> 99	<u>d</u> 100	<u>e</u> 101	<u>f</u> 102	<u>g</u> 103	<u>h</u> 104	<u>i</u> 105	<u>j</u> 106	<u>k</u> 107	<u>l</u> 108	<u>m</u> 109	<u>n</u> 110	<u>o</u> 111
70	0111	<u>p</u> 112	<u>q</u> 113	<u>r</u> 114	<u>s</u> 115	<u>t</u> 116	<u>u</u> 117	<u>v</u> 118	<u>w</u> 119	<u>x</u> 120	<u>y</u> 121	<u>z</u> 122	<u>{</u> 123	<u> </u> 124	<u>}</u> 125	<u>~</u> 126	<u>DEL</u> 127
80	1000	<u>SP</u> 128	<u>SP</u> 129	<u>SP</u> 130	<u>SP</u> 131	<u>SP</u> 132	<u>SP</u> 133	<u>SP</u> 134	<u>SP</u> 135	<u>SP</u> 136	<u>SP</u> 137	<u>SP</u> 138	<u>SP</u> 139	<u>SP</u> 140	<u>SP</u> 141	<u>SP</u> 142	<u>SP</u> 143
90	1001	<u>SP</u> 144	<u>SP</u> 145	<u>SP</u> 146	<u>SP</u> 147	<u>SP</u> 148	<u>SP</u> 149	<u>SP</u> 150	<u>SP</u> 151	<u>SP</u> 152	<u>SP</u> 153	<u>SP</u> 154	<u>SP</u> 155	<u>SP</u> 156	<u>SP</u> 157	<u>SP</u> 158	<u>SP</u> 159
A0	1010	<u>SP</u> 160	<u>SP</u> 161	<u>SP</u> 162	<u>SP</u> 163	<u>SP</u> 164	<u>SP</u> 165	<u>SP</u> 166	<u>SP</u> 167	<u>SP</u> 168	<u>SP</u> 169	<u>SP</u> 170	<u>SP</u> 171	<u>SP</u> 172	<u>SP</u> 173	<u>SP</u> 174	<u>SP</u> 175
B0	1011	<u>SP</u> 176	<u>SP</u> 177	<u>SP</u> 178	<u>SP</u> 179	<u>SP</u> 180	<u>SP</u> 181	<u>SP</u> 182	<u>SP</u> 183	<u>SP</u> 184	<u>SP</u> 185	<u>SP</u> 186	<u>SP</u> 187	<u>SP</u> 188	<u>SP</u> 189	<u>SP</u> 190	<u>SP</u> 191
C0	1100	<u>SP</u> 192	<u>SP</u> 193	<u>SP</u> 194	<u>SP</u> 195	<u>SP</u> 196	<u>SP</u> 197	<u>SP</u> 198	<u>SP</u> 199	<u>SP</u> 200	<u>SP</u> 201	<u>SP</u> 202	<u>SP</u> 203	<u>SP</u> 204	<u>SP</u> 205	<u>SP</u> 206	<u>SP</u> 207
D0	1101	<u>SP</u> 208	<u>SP</u> 209	<u>SP</u> 210	<u>SP</u> 211	<u>SP</u> 212	<u>SP</u> 213	<u>SP</u> 214	<u>SP</u> 215	<u>SP</u> 216	<u>SP</u> 217	<u>SP</u> 218	<u>SP</u> 219	<u>SP</u> 220	<u>SP</u> 221	<u>SP</u> 222	<u>SP</u> 223
E0	1110	<u>SP</u> 224	<u>SP</u> 225	<u>SP</u> 226	<u>SP</u> 227	<u>SP</u> 228	<u>SP</u> 229	<u>SP</u> 230	<u>SP</u> 231	<u>SP</u> 232	<u>SP</u> 233	<u>SP</u> 234	<u>SP</u> 235	<u>SP</u> 236	<u>SP</u> 237	<u>SP</u> 238	<u>SP</u> 239
F0	1111	<u>SP</u> 240	<u>SP</u> 241	<u>SP</u> 242	<u>SP</u> 243	<u>SP</u> 244	<u>SP</u> 245	<u>SP</u> 246	<u>SP</u> 247	<u>SP</u> 248	<u>SP</u> 249	<u>SP</u> 250	<u>SP</u> 251	<u>SP</u> 252	<u>SP</u> 253	<u>SP</u> 254	<u>SP</u> 255

Gray cells are undefined (print a space).

3.7.6.20 National variants

COUNTRY	Hexadecimal codes
	23 24 40 5B 5C 5D 5E 60 7B 7C 7D 7E
0 U.S.A.	# \$ @ [\] ^ ` { } ~
1 France	# \$ à ° ç § ^ ` é ù è ``
2 Germany	# \$ § Ä Ö Ü ^ ` ä ö ü ß
3 U. K.	£ \$ @ [\] ^ ` { } ~
4 Denmark I	# \$ @ Æ Ø Å ^ ` æ ø å ~
5 Sweden	# □ É Ä Ö Å Ü é ä ö å ü
6 Italy	# \$ @ ° \ é ^ ù à ò è ì
7 Spain	Pt \$ @ ¡ Ñ ¿ ^ ` ñ } ~
8 Japan	# \$ @ [¥] ^ ` { } ~
9 Norway	# □ É Æ Ø Å Ü é æ ø å ü
10 Denmark II	# \$ É Æ Ø Å Ü é æ ø å ü

4 CONFIGURATION MENU

4.1 Printer setup and self printing modes

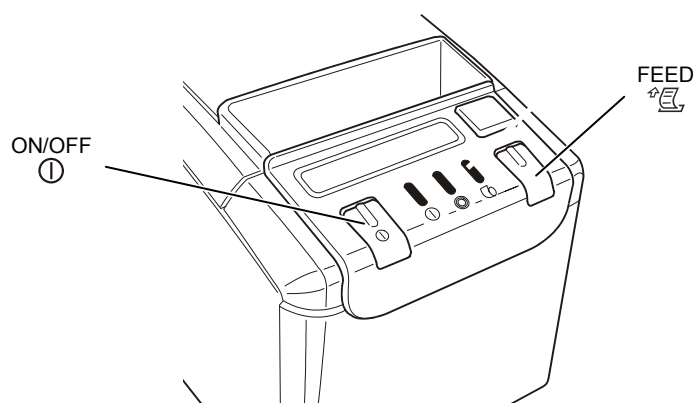
4.1.1 Introduction

This printer model can print in the Self-Test mode, can be configured in the Set-up mode and can print the characters received from the host in Hex Dump (hexadecimal coding) mode.

To access these modes, set the printer accordingly in the Printer Configuration Menu by proceeding as explained below.

4.1.2 Printer Configuration Menu

Proceed as follows to access the printer configuration menu.



1. Printer powered off.
2. Power on the machine by pressing and holding down the **[ON/OFF]** button. Then simultaneously press the **[FEED]** button and keep both buttons pressed until all the LEDs light up.
3. Release both buttons.
4. The machine prints the following menu.

0 Self-test
1 Set-Up
2 Hex Dump

The number printed alongside the printer menu option indicates the number of times the **[ON/OFF]** button must be pressed to access the required environment.

5. Press the **[FEED]** button to confirm your choice and activate the procedure.



4.1.3 Self Test

To print the Self-Test follow one of the two procedures indicated below:

Procedure 1: Switch the printer to the Printer Configuration Menu by following the instructions provided in section 4.1.2; pressing the **[FEED]** button switches the printer to the Self-test mode and then to the online mode.

Procedure 2: With the printer powered off and unplugged from the electrical outlet, plug the printer's power cord back into the electrical outlet while holding down the **[ON/OFF]** button.

To perform Self-Test again, start the procedure from the beginning.

In the Self Test mode the following information is printed: the firmware release, the Setup parameters (with the type of interface board installed) and the selected code page. Provided below is a Self-test printout example.

Printer Setting

```

BOOT Release 4.00 Ver. 007
FW  Release 5.00B Ver. 05

```

Firmware release

I/O

```
Interface installed :USB
Display Baud       :19200
Display Data Bits  :8
Display Parity     :None
```

Advanced I/O

```

Receive buffer size :4096 bytes
Busy condition      :Offline/buf full
Auto LF             :Yes
Pw-On Device enabled :Printer

```

Emulation

Emulation : TM-T88 III

Setup parameters and related values

Print Format

```
Roll width      : 80mm
Nation (codepages) : cp 437
CPI (default font) : 15 (Font A)
Print Density    : 0
Color            : Monochrome
Optimize for     : Speed
Line length      : 42-56 chars/line
```

Advanced Options.....

```

Sound signal      :No
On connection to AC :Printer Off
Power On transmit :None
Tof position      :Shortened
Cutter            :Yes

```

[illegible]

Code page

4.1.3.1 SET UP

The printer's setup is used to access the factory configuration parameter settings. These parameters are already programmed according to some predefined values (or those already set at factory level) and are used to provide special applications on the machine or the option that has already been installed.

The parameters used in the printer setup may be altered in order to print according to user needs.

To print the Setup follow one of two procedures indicated below:

Procedure 1: Switch the printer to the Printer Configuration Menu by following the instructions provided in section 4.1.2; to access printer setup, press the **[ON/OFF]** button and then press the **[FEED]** button to confirm your choice and activate the procedure

Procedure 2: With the printer powered off and unplugged from the electrical outlet, plug the printer's power cord back into the electrical outlet while holding down the **[FEED]** button.

The printer automatically switches to the **I/O** Main Menu option.

The printer is now in setup mode and therefore prints some data including the list of the setup parameters and the values that were previously set (not necessarily the initial ones), the description of the two console buttons, and the first of the three menus available.

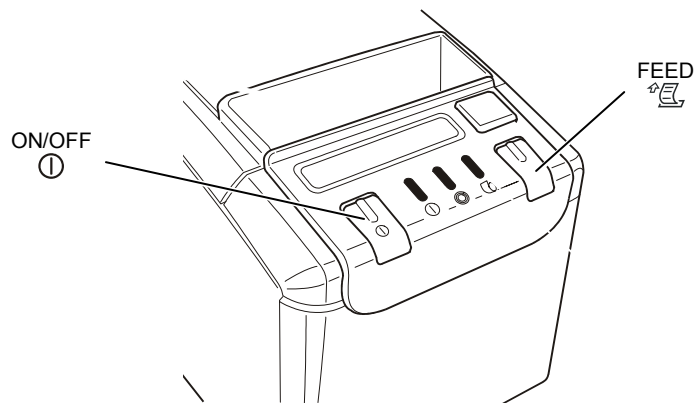
Current Set Up	
BOOT Release 4.00 Ver. 007 FW Release 5.00B Ver. 05	Firmware release
I/O Interface installed :RS-232 9 pin Baud :9600 Data bits :8 Stop :1 Parity :None Handshake :Dtr On Rx Error :Print '?'	
Advanced I/O Receive buffer size :4096 bytes Busy condition :Offline/buf full Auto LF :No Pw-On Device enabled :Printer	
Emulation Emulation :TM-T88 III	Setup parameters and related values
Print Format Roll width :80mm Nation (codepages) :cp 437 CPI (default font) :15 (Font A) Print Density :0 Color :Monochrome Optimize for :Speed Line length :42-56 chars/line	
Advanced Options Sound signal :No On connection to AC :Printer Off Power On transmit :None Tof position :Shortened Cutter :Yes	
To change current setup, please use ON/OFF key to move between options FEED key to select wanted option You can exit from setup using SAVE menu. Open and close cover anytime to discard all changes and return to normal mode.	Description of button functions

Now, you can start programming the printer and modifying the setup parameters according to your needs (see later sections)

4.1.3.2 Button Functions in the Setup Mode

The control panel buttons have the following functions in the Setup mode:

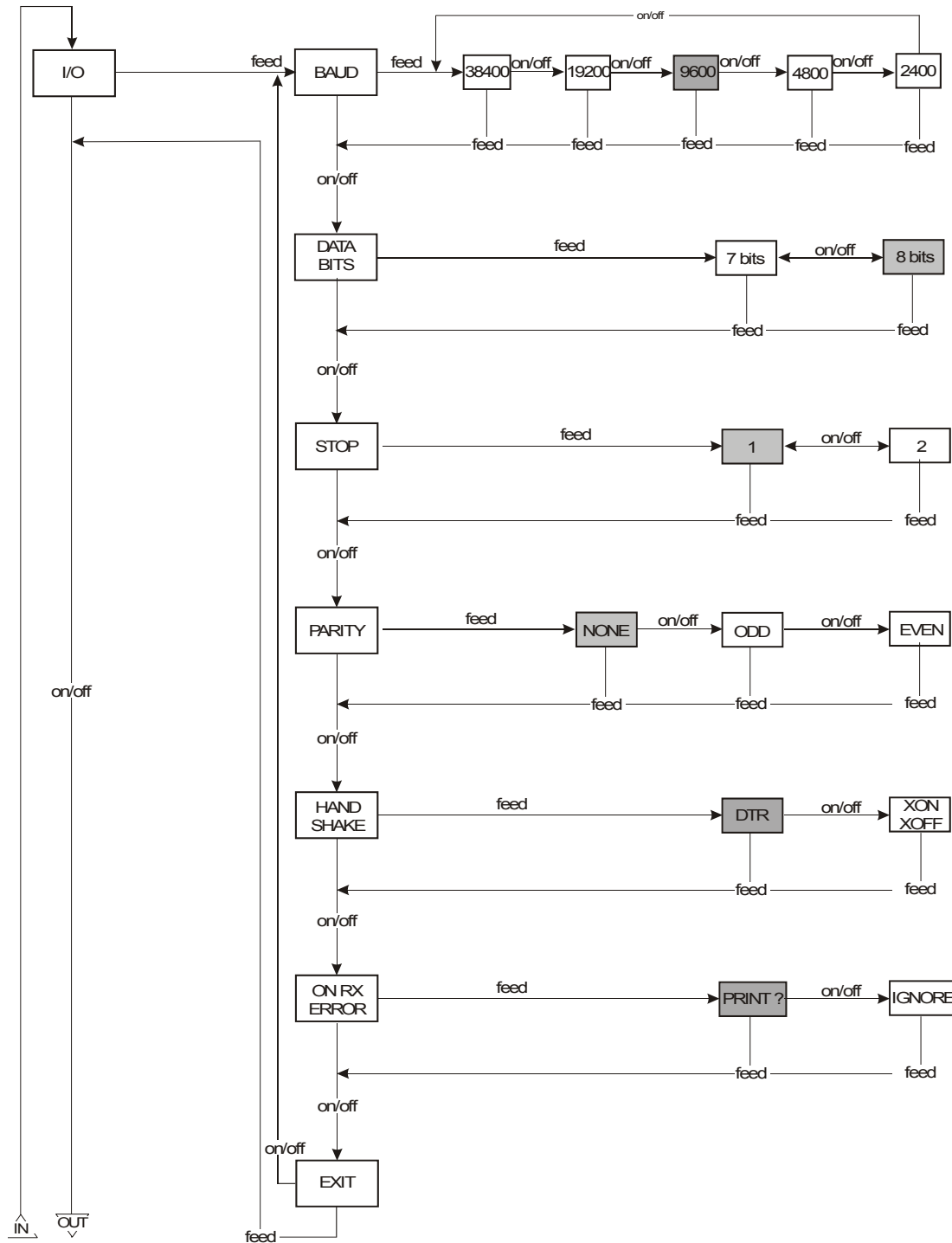
- | | |
|-----------------|--|
| [ON/OFF] | Prints the next parameter of the item selected or the next item of the menu |
| [FEED] | Confirms selection of the last item or parameter printed; prints the first parameter of the item selected or the next item of the menu |

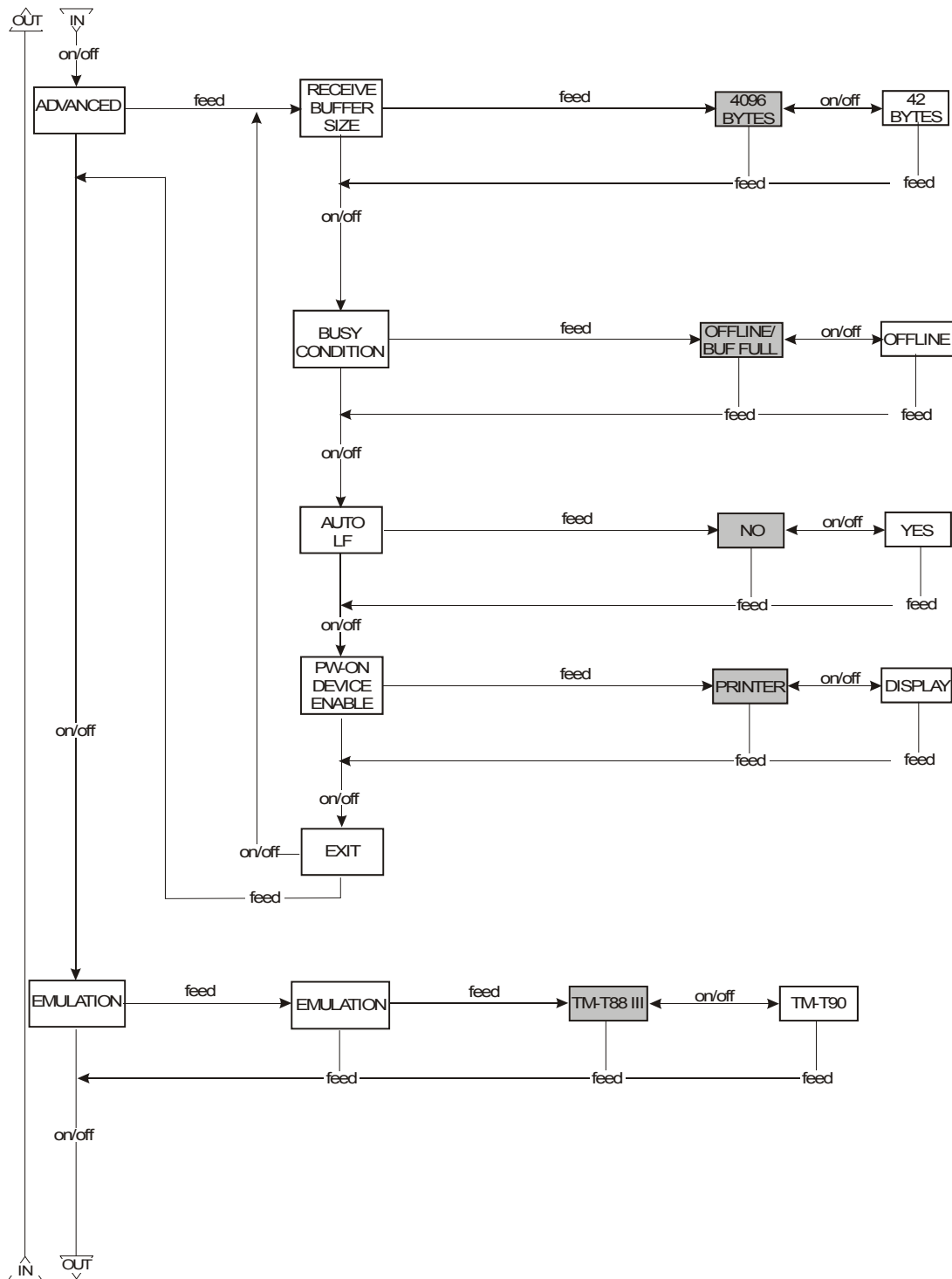


4.1.3.3 Navigating through Printer Setup

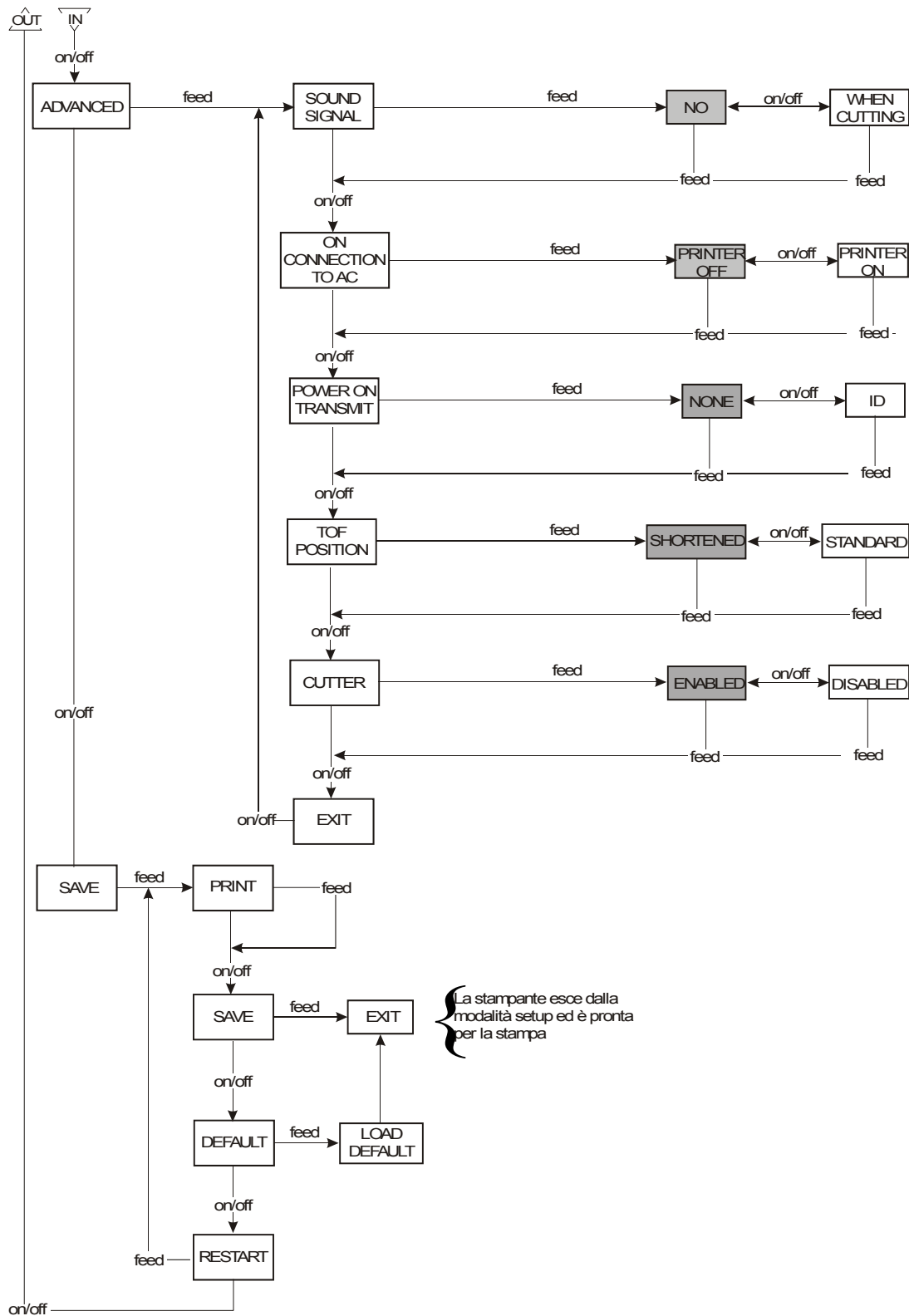
Flow Chart

The following flow chart shows how to navigate through printer setup. The factory defaults are enclosed in grey boxes.









4.1.3.4 Notes and Meaning of the Parameters/ List of parameters that can be changed

The setup parameters that follow are in alphabetical order to simplify consultation.

The values in bold are the factory default values.

I/O	Interface menu (Input/Output).
INSTALLED INTERFACE :RS-232 25	Serial interface parameters menu selection.
BAUD: 2400, 4800, ..., 9600 38400	Data transmission/reception rate.
DATA BIT: 7, 8	Data format, 7 or 8 bits.
STOP: 1 , 2	Number of stop bits.
PARITY: NONE , ODD, EVEN	Parity control type.
HANDSHAKE: DTR - XON/XOFF	Data handshaking protocol.
ON RX ERROR: PRINT ? , IGNORED	Data receive error: print a "?" or ignore.
ADVANCED I/O	Advanced interface menu (Input/Output).
RECEIVE BUFFER SIZE: 4096 , 42	The receive buffer size in byte.
BUSY CONDITION: OFFLINE/BUF FULL - OFFLINE	The printer is BUSY if it is: - off-line or when the receive buffer is full (OFFLINE/BUF FULL); - only when the receive buffer is full.
AUTO LF: NO , YES	Auto line feed: (NO:disable – YES:enable).
PW-ON DEVICE ENABLED: PRINTER , DISPLAY	PRINTER: At power on, the printer is ready to receive data. DISPLAY: At power on, the display is enabled. To enable the printer, use the ESC = command.
EMULATION	Menu of available emulations.
EMULATION: TM-T88 III – TM-T90	TM-T88III : monochrome emulation TM-T90: enable two-color paper usage
PRINT FORMAT	Menu of print parameters.
ROLL WIDTH: 80 mm , 58 mm, 60 mm	With a specific adapter, 58 or 60 mm rolls can be used.
NATION CODEPAGES: 437 , 850 ...	Character set national variants.
CPI DEFAULT FONT: 15 FONT A , 20 FONT B	Print pitch selection, expressed as a number of characters per inch.
PRINT DENSITY: 0	0 = standard paper used. If paper is more sensitive, use negative values to make image lighter. If paper is less sensitive than standard paper, use a positive value to make the image darker.
COLOR: MONOCHROME , TWO-COLOR PAPER	Selects between monochrome or two-color printing.

OPTIMIZE FOR: SPEED , QUALITY	Choice of BIM print quality: SPEED equals fast print speed and standard quality printout, QUALITY equals lower print speed and top quality printout.
LINE LENGTH: 42/56 CHARS , 43/57 CHARS	Selects the number of characters per line. - 42/56 corresponds to 560 dots - 43/57 corresponds to 576 dots.
ADVANCED	Sets advanced parameters.
SOUND SIGNAL: NO , WHEN CUTTING	Enables an audible signal to be sounded at each paper cut.
ON CONNECTION TO AC: PRINTER OFF , PRINTER ON	PRINT OFF: the printer remains powered off when the power cord is plugged. PRINT ON: the printer powers on when the power cord is plugged.
POWER ON TRANSMIT: NONE , ID	Selecting the ID option configures the printer to send an identification string at power on.
TOF POSITION : STANDARD, SHORTENED	Choice of TOF value after receipt cutting: STANDARD= ~42 mm, SHRTENED= ~7 mm
CUTTER: ENABLED , DISABLED	Enables or disables cutter operation.
PRINT	Print the current setup parameters.
SAVE & EXIT	Stores the pre-settings selected in the current SET-UP section and exit.
DEFAULT	Restore the setup parameter values set in the factory.
RESTART	Reinitialize the setup procedure, without storing the pre-settings set before.

4.1.3.5 How to select the parameters

After access to the setup - see the section Setup - the machine prints the first main menu "I/O".

At this point there are two alternatives:

1. If you press the **[FEED]** button (you select the menu), the machine prints the first parameter of this menu "USER: NATION".
2. If you press the **[ON/OFF]** button (you do not select the menu USER), the machine prints the second main menu "I/O".

Assuming your selection was 1, there are again two alternatives:

- a If you press the **[FEED]** button (you select the parameter USER: NATION), the machine prints the first value of the parameter "NATION: 437".
- b If you press the **[ON/OFF]** button (you do not select "NATION"), the machine prints "CPI", the second parameter of the menu USER.
..... and so on.

In brief:

1. In setup mode, the machine prints and proposes one item or one parameter at a time.
2. The item or parameter can be accepted and selected with the **[FEED]** button or refused with the **[ON/OFF]** button.

4.1.4 Hex-Dump

Provided below is information on how to access the Hex-dump mode.

- To access printer setup, press the **[ON/OFF]** button twice.
- Press the **[FEED]** button to confirm your choice and activate the procedure

The printer prints the hexadecimal codes indicated below.

```
1B 40 1D 48 32 1D 6B 48 07 43 6F 64 65 20
33 39 0A 1B 40 1D 48 32 1D 6B 48 07 43 6F
64 65 20 33 39 0A 1B 40 1D 48 32 1D 6B 48
07 43 6F 64 65 20 33 39 0A 1B 40 1D 48 32
1D 6B 48 07 43 6F 64 65 20 33 39 0A 1B 40
1D 48 32 1D 6B 48 07 43 6F 64 65 20 33 39
0A 1B 40 1D 48 32 1D 6B 48 07 43 6F 64 65
20 33 39 0A 1B 40 1D 48 32 1D 6B 48 07 43
6F 64 65 20 33 39 0A 1B 40 1D 48 32 1D 6B
48 07 43 6F 64 65 20 33 39 0A 1B 40 1D 48
32 1D 6B 48 07 43 6F 64 65 20 33 39 0A 1B
40 1D 48 32 1D 6B 48 07 43 6F 64 65 20 33
39 0A 1B 40 1D 48 32 1D 6B 48 07 43 6F 64
65 20 33 39 0A 1B 40 1D 48 32 1D 6B 48 07
43 6F 64 65 20 33 39 0A 1B 40 1D 48 32 1D
6B 48 07 43 6F 64 65 20 33 39 0A 1B 40 1D
48 32 1D 6B 48 07 43 6F 64 65 20 33 39 0A
1B 40 1D 48 32 1D 6B 48 07 43 6F 64 65 20
33 39 0A 1B 40 1D 48 32 1D 6B 48 07 43 6F
64 65 20 33 39 0A 1B 40 1D 48 32 1D 6B 48
07 43 6F 64 65 20 33 39 0A 1B 40 1D 48 32
1D 6B 48 07 43 6F 64 65 20 33 39 0A
```

5. COMMAND DESCRIPTION

5.1 Introduction

This printer model interprets the data received from the line in the form of special code sequences. If any of these sequences are sent, the printer performs the function that it represents. There is no common method of controlling data. The leading printer manufacturers have created their own control "standards" according to the printing technology, applications to be used, etc. Other manufacturers have adapted to these standards, by making printers that try to behave like ("emulate") the original leading printers; hence the concept of "EMULATION".

This printer model uses the Epson TM-T88III and TM-T90 series emulation code set.

5.2 List of control codes

Code (Hexadecimal)	Command	Page
09	Horizontal tab	67
0A	Print and line feed	64
0C	Print and return in standard mode	64
0D	Print and carriage return	64
18	Cancel print data in page mode	130
1B 57 ..	Set printing area in page mode	127
1B 61 n	Select justification	71
1D 4C ..	Set left margin	71
1D 57 ..	Set printing area width	72
1B 4A n	Print and feed paper	66
1B 32	Select default line spacing	65
1B 33 n	Set line spacing	65
1B 64 n	Set horizontal tab position	69
1D 50 ..	Set horizontal and vertical motion units	73
1B 20 n	Set right-side character spacing	74
1D 21 n	Select character size	80
10 04 n	Real time status transmission	113
10 05 n	Real time request to printer	116
10 14 ..	Generate pulse at real-time	115
1B 40	Initialize printer	63
1D 49 n	Transmit printer ID	106
1D 61 n	Enable/Disable Automatic Status Back	109
1D 72 n	Transmit status	108
1D 28 ..	Customize NV memory area	93
1B 3D n	Select peripheral device	123
1B 70 ..	Generate pulse	123
1B 2A ..	Select bit-image mode	82
1B 25 n	Select/cancel user-defined character set	87
1B 26 ..	Define user-defined characters	88
1B 3D n	Cancel user-defined characters	91
1C 70 ..	Print NV bit image	102
1C 71 ..	Define NV bit image	103
1D 2A ..	Define downloaded bit image	91
1D 2F n	Print downloaded bit image	101
1D 76 30 ..	Print raster bit image	84
1D 28 4C	Select graphics data	95
1B 21 n	Select print mode(s)	74
1B 0C	Print data in page mode	125
1B 2D n	Turn underline mode on/off	76
1B 45 n	Turn emphasized mode on/off	77
1B 47 n	Turn double-strike mode on/off	77
1B 4C	Select page mode	125
1B 4D n	Select character font	91
1B 53	Select standard mode	126
1B 54 n	Select print direction in page mode	127
1B 56 n	Turn 90° clockwise rotation mode on/off	78
1D 42 n	Turn white/black reverse printing mode on/off	76
1D 48 n	Select printing position of HRI characters	117
1D 62 n	Turn smoothing mode on/off	81

1B 52 n	Select an international character set	85
1B 74 n	Select character code table	86
1D 66 n	Select font for HRI characters	122
1D 68 n	Select bar code height	117
1D 6B ..	Print bar code	118
1D 77 n	Select bar code width	122
1B 24 ..	Set absolute print position	68
1B 44 ..	Set horizontal tab positions	69
1B 5C ..	Set relative print position	70
1B 7B n	Turns on/off upside-down printing mode	79
1B 63 33 n	Enable/disable paper end signal	124
1B 63 34 n	Select paper sensor(s) to stop printing	131
1B 63 35 n	Enable/disable panel buttons	131
1D 24 n	Set absolute vertical print position in page mode	129
1D 28 41 ..	Execute test print	105
1D 3A	Start/end macro definition	132
1D 56 ..	Select cut mode and cut paper	63
1D 5C ..	Set relative vertical print position in page mode	129
1D 5E ..	Execute macro	132
1B 07	Issues an audible signal	123

5.3 List of TM-T88III Series Emulation Environment

Command	Name	Command classification		Standard mode	Page mode	GS P function
		Execut.	Setting			
LF	Decimal code: Print and line feed	O		O	O	
FF	Print and return to standard mode (in page mode)	O		Ignored	O	
CR	Print and carriage return	O		O	O	
CAN	Cancel print data in page mode	O		Ignored	O	
DLE EOT	Real-time status transmission	O		O	O	
DLE ENQ	Real-time request to printer	O		O	O	
DLE DC4	Generate pulse at real-time	O		O	O	
ESC FF	Print data in page mode	O		Ignored	O	
ESC BEL	Issues an audible signal	O		O	O	
ESC SP	Set right-side character spacing		O	O	O	O
ESC !	Select print mode(s)		O	O	O	
ESC \$	Set absolute print position	O		O	O	O
ESC %	Select/cancel user-defined character set		O	O	O	
ESC &	Define user-defined characters		O	O	O	
ESC _	Select bit-image mode	O		O	O	
ESC -	Turn underline mode on/off		O	O	O	
ESC 2	Select default line spacing		O	O	O	
ESC 3	Set line spacing		O	O	O	O
ESC =	Select peripheral device		O	O	O	
ESC ?	Cancel user-defined characters		O	O	O	
ESC @	Initialize printer	O	O	O	O	
ESC D	Set horizontal tab positions		O	O	O	
ESC E	Turn emphasized mode on/off		O	O	O	
ESC G	Turn double-strike mode on/off		O	O	O	
ESC J	Print and feed paper	O		O	O	O
ESC L	Select page mode	O		(O)	Ignored	
ESC M	Select character font			O	O	
ESC R	Select an international character set		O	O	O	
ESC S	Select standard mode	O		Ignored	O	
ESC T	Select print direction in page mode		O	**	O	
ESC V	Turn 90° clockwise rotation mode on/off		O	O	**	
ESC W	Set printing area in page mode		O	**	O	O
ESC \	Set relative print position	O		O	O	O
ESC a	Select justification		O	(O)	**	
ESC c 3	Select paper sensor(s) to output paper-end signals		O	O	O	
ESC c 4	Select paper sensor(s) to stop printing		O	O	O	
ESC c 5	Enable/disable panel buttons		O	O	O	
ESC d	Print and feed n lines	O		O	O	
ESC p	General pulse	O		O	O	
ESC t	Select character code table		O	O	O	
ESC {	Turn upside-down printing mode on/off		O	(O)	**	
FS p	Print NV bit image	O		O	Disabled	
FS q	Define NV bit image		O	(O)	Disabled	
GS !	Select character size		O	O	O	
GS \$	Set absolute vertical print position in page mode	O		Ignored	O	O
GS _	Define downloaded bit image		O	O	O	
GS (A	Execute test print	O		O	Disabled	
GS /	Print downloaded bit image	O		*	O	
GS :	Start/end macro definition	O	O	O	O	
GS B	Turn white/black reverse printing mode on/off		O	O	O	
GS H	Select printing position of HRI characters		O	O	O	
GS I	Transmit printer ID	O		O	O	

Command	Name	Command classification		Standard mode	Page mode	GS P function
		Execut.	Setting			
GS L	Set left margin		O	(O)	**	O
GS P	Set horizontal and vertical motion units		O	O	O	
GS V	Select cut mode and cut paper	O		(O)	O	O
GS W	Set printing area width		O	(O)	**	O
GS \	Set relative vertical print position in page mode			Ignored	O	O
GS ^	Execute macro	O		O	O	
GS a	Enable/disable Automatic Status Back (ASB)	O	O	O	O	
GS b	Turn smoothing mode on/off		O	O	O	
GS f	Select font for HRI characters		O	O	O	
GS h	Set bar code height		O	O	O	
GS k	Print bar code	O		*	O	
GS r	Transmit status	O		O	O	
GS v 0	Print raster bit image	O		*	Disabled	
GS w	Set bar code width		O	O	O	

5.4 List of TM-T90 Series Emulation Environment

Command	Name	Command classification		Standard mode	Page mode	GS P function
		Execut.	Setting			
GS (E	Customize NV memory area		O	O	O	
GS (L GS 8 L	Select graphics data		O	O	O	
GS (N	Select character style		O	O	O	

Command classification

Executing: Printer executes the command, which does not then affect the following data.

Setting: Printer uses flags to make settings, and those settings affect the following data.

Standard mode (prints one line at a time)

O: Enabled.

(O): Enabled only when the command is set at the beginning of a line.

*: Enabled only when data is not present in the printer buffer.

Page mode (definition and printing of an entire area, refer to Appendix H)

O: Enabled.

***: Only value setting is possible.

Disabled: Parameters are processed as printable data.

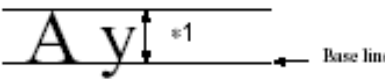
Ignored: All command codes including parameters are ignored and nothing is executed.

GS P function: codes whose parameters are interpreted by the value defined in the GS P command code.

5.5 Commands

5.5.1 Explanation of Terms

The following table gives an explanation of the terms that you will encounter in the descriptions of the commands provided further on.

TERM	DESCRIPTION
Receive buffer	The receive buffer is a buffer that stores, as is, the data received from the host (the reception data). The reception data is stored in the receive buffer temporarily, and is then processed sequentially.
Print buffer	The print buffer is a buffer that stores the image data to be printed.
Print buffer full	This is the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the LF operation.
Start of line	The start of line state satisfies the following condition • There is no print data (including spaces and portions of data skipped due to bit image data) currently in the print buffer. • There is no print data (including portions of data skipped due to HT) • The print position is not specified by the ESC \$ or ESC \ command.
Printable area	The maximum range within which printing is possible under the printer specifications. The printable area for this printer is as follows: 1. The length of the horizontal direction in standard mode: approximately 72.2 mm {512/180"} 2. The length of the horizontal direction in page mode: approximately 72.2 mm {512/180"} 3. The length of the vertical direction in page mode: approximately 117.3 mm {1662/360"}
Printing area	Printing range is set by the command. It must be printing area $Y \leq$ printable area.
Ignore	The state in which all codes, including parameters, are read in and discarded, and nothing happens.
Inch	A unit of length. One inch is 25.4 mm.
MSB	Most Significant Bit
LSB	Least Significant Bit
Base line	Standard position when character data is stored in the print buffer. Normal character in standard mode and page mode:  *1. When font A (12·24 dots) is selected, this height is for 21 dots. When font B (9·17 dots) is selected, this height is for 16 dots.
	Rotated character in standard mode (only when font A is selected)

5.5.2 Command conventions (AXIOHM)

The following information describes how each command is organized:

Command Name

A designation (not the ASCII code) used to identify the command.

Description

A brief summary of the command, followed by detailed information, if necessary.

ASCII	the ASCII control code
Hexadecimal	the Hexadecimal control code
Decimal	the Decimal control code
Value or Values	a description of the command operand values
Range	the upper and lower limits of the command operand
Default	the command operand default after printer reset
Formulas	any formula used for this command.

Exceptions

Describes any exceptions to this command, for example, other commands that the command can not be used with.

Related Information

This section describes any related information for this command and provides references to other sections for additional information.

6. COMMANDS FUNCTION

6.1 Reset Commands

INITIALIZE PRINTER

Synopsis: Initialize printer.

ASCII ESC @

Hexadecimal 1B 40

Decimal 27 64

Description: Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

- The data in the receive buffer is not cleared.
- The macro definition is not cleared.
- The NV bit image data is not cleared.
- The data of the NV user memory is not cleared.

6.2 Paper Cut Commands

SELECT CUT MODE

SELECT CUT MODE AND CUT PAPER

Synopsis: Select cut mode “and cut paper”.

ASCII GS V *m* GS V *m* *n*

Hexadecimal 1D 56 **m** 1D 56 **m** **n**

Decimal 29 86 *m* 29 86 *m* *n*

Operands: (1) *m* = 0, 1, 48, 49 (2) *m* = 65, 66, *n* = 0-255

Description: Selects a mode for cutting paper and executes paper cutting. The value of *m* selects the mode as follows:

<i>m</i>	Print mode (TM-T88 III)	Print mode (TM-T90)
0, 48	Not available	Cuts paper (one point left uncut, full cut).
1, 49	Partial cut (one point left uncut)	
65	Not available	Feeds and cuts paper (one point left uncut, full cut).
66	Feeds paper (cutting position + [<i>n</i> x (vertical motion unit)], and cuts the paper partially (one point left uncut).	

- (1) and (2):**
- This command is effective only processed at the beginning of a line.
- (1):**
- Only the partial cut is available; there is no full cut.
- (2):**
- When *n* = 0, the printer feeds the paper to the cutting position and cuts it.
 - When *n* ≠ 0, the printer feeds the paper to (cutting position + [*n* × vertical motion unit]) and cuts it.
 - The horizontal and vertical motion unit are specified by **GS P**.
 - The paper feed amount is calculated using the vertical motion unit (*y*). However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

6.3 Vertical positioning and print commands

The vertical positioning and print commands control the vertical print positions of characters on the receipt. The commands are described in order of their hexadecimal codes.

PRINT AND RETURN TO STANDARD MODE IN PAGE MODE

Synopsis:	Print and return standard mode in page mode.
ASCII	FF
Hexadecimal	0C
Decimal	12
Description:	Print the data in the print buffer collectively and returns to standard mode. • The buffer data is deleted after being printed. • The print area set by ESC W is reset to the default setting. • The printer does not execute paper cutting. • This command sets the print position to the beginning of the line. • This command is enabled only in page mode.
See also:	ESC FF, ESC L, ESC S

PRINT AND LINE FEED

Synopsis:	Print and line feed.
ASCII	LF
Hexadecimal	0A
Decimal	10
Description:	Prints the data in the print buffer and feeds one line based on the current line spacing.
Note:	This command sets the print position to the beginning of the line.
See also:	ESC 2, ESC 3

PRINT AND CARRIAGE RETURN

Synopsis:	Print and carriage return.
ASCII	CR
Hexadecimal	0D
Decimal	13
Description:	When automatic line feed is enabled, this command functions the same as LF; when automatic line feed is disabled, this command is ignored. • Sets the print starting position to the beginning of the line. • The automatic line feed is ignored with a serial interface model. • This command is set according to the SETUP setting with a parallel interface model.
See also:	LF

SELECT DEFAULT LINE SPACING

Synopsis: Select default line spacing.

ASCII ESC 2

Hexadecimal 1B 32

Decimal 27 50

Description: Selects approximately 4.23 mm {1/6"} spacing.

- The line spacing can be set independently in standard mode and in page mode.

See also: ESC 3

SET LINE SPACING

Synopsis: Set line spacing.

ASCII ESC 3 n

Hexadecimal 1B 33 n

Decimal 27 51 n

Range of n 0-255

Description: Sets the line spacing to [$n \times$ vertical or horizontal motion unit].

- The line spacing can be set independently in standard mode and in page mode.
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current line spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the vertical motion unit (y) is used.
- In page mode, this command functions as follows, depending on the starting position of the printable area:
 - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
 - (2) When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum paper feed amount is 1016 mm {40"}. Even if a paper feed amount of more than 1016 mm {40"} is set, the printer feeds the paper only 1016 mm {40"}.

Default: Line spacing equivalent to approximately 4.23mm {1/6"}.

See also: ESC 2, GS P

PRINT AND FEED PAPER

Synopsis: Print and feed paper.

ASCII ESC J n

Hexadecimal 1B 4A n

Decimal 27 74 n

Range of n : 0-255

Description: Prints the data in the print buffer and feeds the paper [$n \times$ vertical or horizontal motion unit].

- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC 3**.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the printer uses the vertical motion unit (y).
- In page mode, this command functions as follows, depending on the starting position of the printable area:
 - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (y) is used.
 - (2) When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (x) is used.
- The maximum line spacing is 1016mm {40"}. When the setting value exceeds the maximum, it is converted to the maximum automatically.

See also: GS P

PRINT AND FEED N LINES

Synopsis: Print and feed n lines.

ASCII ESC d n

Hexadecimal 1B 64 n

Decimal 27 100 n

Range of n 0-255

Description: Prints the data in the print buffer and feeds n lines.

- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
- The maximum paper feed amount is 1016 mm {40"}. If the paper feed amount ($n \cdot$ line spacing) of more than 1016 mm {40"} is specified, the printer feeds the paper only 1016 mm {40"}.

See also: **ESC 2, ESC 3**

6.4 Horizontal positioning commands

The horizontal positioning commands control the horizontal print positions of characters on the receipt. The commands are described in order of their hexadecimal codes.

HORIZONTAL TAB

Synopsis: Horizontal tab.

ASCII HT

Hexadecimal 09

Decimal 9

Description: Moves the print position to the next horizontal tab position.

- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].
- Horizontal tab positions are set with ESC D.
- If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
- The default setting of the horizontal tab position for the paper roll is font A (12 × 24) every 8th character (9th, 17th, 25th, ... column).

See also: ESC D

SET ABSOLUTE PRINT POSITION

Synopsis: Set absolute print position.

ASCII ESC \$ nL nH

Hexadecimal **1B** **24** **nL** **nH**

Decimal 27 36 nL nH

Value of n: nL = 0-255
 nH = 0-255

Description: Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.

- The distance from the beginning of the line to the print position is $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$.
- Settings outside the specified printable area are ignored.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit (x) is used.
- In page mode, horizontal or vertical motion unit differs depending on the starting position of the printable area as follows:
 - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

See also: ESC \, GS \$, GS \, GS P

SET HORIZONTAL TAB POSITIONS

Synopsis:	Set horizontal tab positions.				
ASCII	ESC	D	[n]	...k	NUL
Hexadecimal	1B	44	[n]	...k	0
Decimal	27	68	[n]	...k	0

Value of n: specifies the column number for setting a horizontal tab position from the beginning of the line.

Value of k: indicates the total number of horizontal tab positions to be set.

Default: The default tab positions are at intervals of 8 characters (columns 9, 17, 25,...) for font A (12 x 24).

- Description:** Sets horizontal tab positions.
- The horizontal tab position is stored as a value of [character width □ n] measured from the beginning of the line. The character width includes the right-side character spacing, and double-width characters are set with twice the width of normal characters.
 - This command cancels the previous horizontal tab settings.
 - When setting $n = 8$, the print position is moved to column 9 by sending **HT**.
 - Up to 32 tab positions ($k = 32$) can be set. Data exceeding 32 tab positions is processed as normal data.
 - Transmit [n]k in ascending order and place a NUL code 0 at the end.
 - When [n]k is less than or equal to the preceding value [n]k-1, tab setting is finished and the following data is processed as normal data.
 - **ESC D NUL** cancels all horizontal tab positions.
 - The previously specified horizontal tab positions do not change, even if the character width changes.
 - The character width is memorized for each standard and page mode.

See also: HT

SET RELATIVE PRINT POSITION

Synopsis: Set relative print position.

ASCII	ESC	\	nL	nH
Hexadecimal	1B	5C	nL	nH
Decimal	27	92	nL	nH

Range of n : nL = 0-255
nH = 0-255

Description: Sets the print starting position based on the current position by using the horizontal or vertical motion unit.

- This command sets the distance from the current position to $[(nL + nH \times 256) \times \text{horizontal or vertical motion unit}]$
- Any setting that exceeds the printable area is ignored.
- When pitch N is specified to the right:

$$nL + nH \times 256 = N$$
 When pitch N is specified to the left (the negative direction), use the complement of 65536.
 When pitch N is specified to the left: $nL + nH \times 256 = 65536 - N$
- The print starting position moves from the current position to $[N \times \text{horizontal or vertical motion unit}]$
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
 - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

See also: ESC \$, GS P

SELECT JUSTIFICATION

Synopsis: Select justification.

ASCII	ESC	a	n
Hexadecimal	1B	61	n
Decimal	27	97	n

Range of n 0-2, 48-50

Value of n
 0, 48 = Left justification
 1, 49 = Centering
 2, 50 = Right justification

Description: Aligns all the data in one line to the specified position.

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command has no effect in page mode.
- This command executes justification in the printing area.
- This command justifies the space area according to **HT**, **ESC \$** or **ESC **

Default: n = 0

Example:

Left justification	Centering	Right justification
ABC ABCD ABCDE	ABC ABCD ABCDE	ABC ABCD ABCDE

SET LEFT MARGIN

Synopsis: Set left margin.

ASCII	GS	L	nL	nH
Hexadecimal	1D	4C	nL	nH
Decimal	29	76	nL	nH

Range of nL 0-255

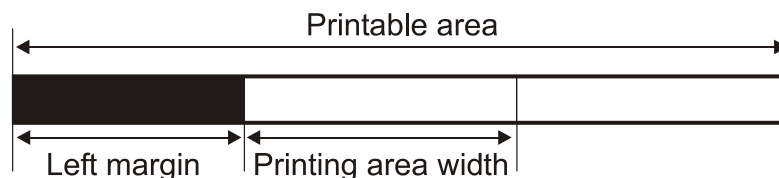
Range of nH 0-255

Default: nL = 0, nH = 0

Description: Sets the left margin using *nL* and *nH*.

- The left margin is set to $[(nL + nH \times 256) \times \text{horizontal motion unit}]$ inches.
- This command is effective only processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the setting exceeds the printable area, the maximum value of the printable area is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion unit does not affect the current left margin.
- The horizontal motion unit (*x*) is used for calculating the left margin. The calculated result is truncated to the minimum value of the mechanical pitch.

See also: GS P, GS W



SET PRINTING AREA WIDTH

Synopsis: Set printing area width.

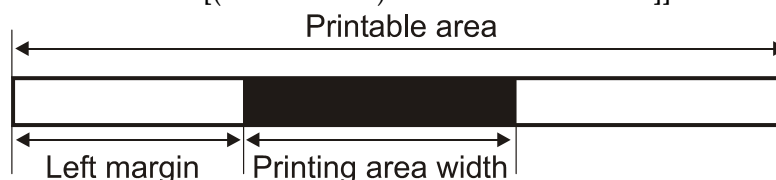
ASCII	GS	W	<i>nL</i>	<i>nH</i>
Hexadecimal	1D	57	nL	nH
Decimal	29	87	<i>nL</i>	<i>nH</i>

Range of nL 0-255

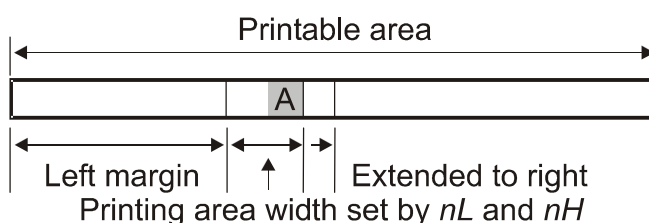
Range of nH 0-255

Description: Sets the printing area width to the area specified by *nL* and *nH*.

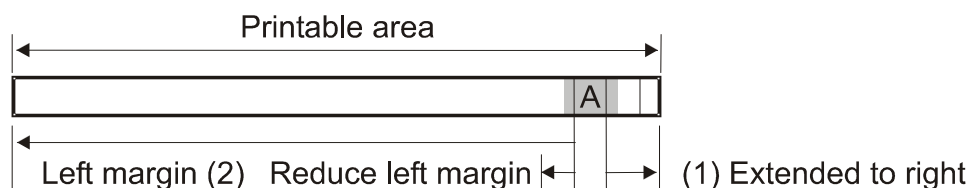
- The printing area width is set to $[(nL + nH \times 256) \times \text{horizontal motion unit}]$.



- This command is effective only processed at the beginning of the line.
- In page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- If the [left margin + printing area width] exceeds the printable area, [printable area width - left margin] is used.
- The horizontal and vertical motion units are specified by **GS P**. Changing the horizontal and vertical motion units does not affect the current left margin.
- The horizontal motion unit (*x*) is used for calculating the printing area width. The calculated result is truncated to the minimum value of the mechanical pitch.
- If the width set for the printing area is less than the width of one character, when the character data is developed, the following processing is performed:
 - The printing area width is extended to the right to accommodate one character.



- If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one character.



- If the printing area width cannot be extended sufficiently, the right space is reduced.

- If the width set for the printing area is less than one line in vertical, the following processing is performed only on the line in question when data other than character data (e.g., bit image, user-defined bit image) is developed:

1. The printing area width is extended to the right to accommodate one line in vertical for the bit image within the printable area.
 2. If the printing area width cannot be extended sufficiently, the left margin is reduced to accommodate one line in vertical.
- The commands which set the printing area width for bit image printing and its minimum widths are as follows:
 - Bit image (**ESC**):
 - Single density mode = 2 dots Double density mode = 1 dot
 - Downloaded bit image (**GS /**):
 - Double width mode or Quadruple mode = 2 dots Normal mode or Double-height mode = 1 dot
 - NV bit image (**FS p**):
 - Double width mode or Quadruple mode = 2 dots Normal mode or Double-height mode = 1 dot
 - Raster bit image (**GS v 0**):
 - Double width mode or Quadruple mode = 2 dots Normal mode or Double-height mode = 1 dot

Default: $nL = 0, nH = 2$

See also: GS L, GS P

SET HORIZONTAL AND VERTICAL MOTION UNITS

Synopsis: Set horizontal and vertical motion units.

ASCII GS P x y

Hexadecimal 1D 50 x y

Decimal 29 80 x y

Range: x = 0-255

y = 0-255

Description: Sets the horizontal and vertical motion units to approximately 25.4/x mm { 1/x inches} and approximately 25.4/y mm {1/y inches}, respectively.

When x and y are set to 0, the default setting of each value is used.

- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.
- In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):
 1. Commands using x : **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**
 2. Commands using y : **ESC 3, ESC J, GS V**
- In page mode, the following command use x or y, depending on character orientation:
 1. When the print starting position is set to the upper left or lower right of the printing area using **ESC T**
 - Commands using x : **ESC SP, ESC \$, ESC W, ESC \, FS S**
 - Commands using y : **ESC 3, ESC J, ESC W, GS \$, GS \, GS V**
 2. When the print starting position is set to the upper right or lower left of the printing area using **ESC T** (data is buffered in the paper feed direction):
 - Commands using x : **ESC 3, ESC J, ESC W, GS \$, GS **
 - Commands using y : **ESC SP, ESC \$, ESC W, ESC \, FS S, GS V**
- The command does not affect the previously specified values.
- The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.

Default: x = 180, y = 360

See also: **ESC SP, ESC \$, ESC 3, ESC J, ESC W, ESC \, GS \$, GS L, GS V, GS W, GS **

6.5 Print characteristics commands

These commands control what the printed information looks like, selection of character sets, and setting of margins. The commands are described in order of their hexadecimal codes.

SET RIGHT-SIDE CHARACTER SPACING

Synopsis: Set right-side character spacing.

ASCII	ESC	SP	n
Hexadecimal	1B	20	n
Decimal	27	32	n

Range of n 0-255

Default n=0

Description: Sets the character spacing for the right side of the character to [$n \times$ horizontal or vertical motion units].

- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is n times normal value.
- This command does not affect the setting of Kanji characters.
- This command sets values independently in each mode (standard and page modes).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
 - (1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
- The maximum right-side spacing is 35.983 mm {255/180"}. Any setting exceeding the maximum is converted to the maximum automatically.

See also: GS P

SELECT PRINT MODE(S)

Synopsis: Select print mode(s).

ASCII	ESC	!	n
Hexadecimal	1B	21	n
Decimal	27	33	n

Value of n:

Bit ¹	Function	0	1
Bit 0	Pitch	Standard Pitch (16x24)	Compressed Pitch (12x24)
Bit 4	Double High	Cancelled	Set
Bit 5	Double Wide	Cancelled	Set
Bit 7	Underlined Mode	Cancelled	Set (bar thickness = 2)

¹ Bits 1,2,3 and 6 are not used "0"

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (13 × 27).

	On	01	1	Character font B (10 × 20).
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

Description: Selects print modes using *n* as above.

- When both double-height and double-width modes are selected, quadruple size characters are printed.
- The printer can underline all characters, but can not underline the space set by **HT** or 90° clockwise rotated characters.
- The thickness of the underline is that selected by **ESC -**, regardless of the character size.
- When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- **ESC -** can also turn on or off underline mode. However, the setting of the last received command is effective.
- **GS !** can also select character size. However, the setting of the last received command is effective.
- Emphasized mode is effective for alphanumeric. All print modes except emphasized mode is effective only for alphanumeric.

See also: ESC -, ESC E, GS !

TURN UNDERLINE MODE ON/OFF

Synopsis: Turn underline mode on/off.

ASCII ESC - n

Hexadecimal 1B 2D n

Decimal 27 45 n

Value of *n*:

0-48 = Turns off underline mode

1-49 = Turns on underline mode (1-dot thick)

2-50 = Turns on underline mode (2-dots thick)

Default: n = 0

Description: Turns underline mode on or off, based on the values of **n** above.

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT**.
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of *n* to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.
- Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.

See also: ESC !

TURN WHITE/BLACK REVERSE PRINTING MODE ON/OFF

Synopsis: Turn white/black reverse printing mode on/off.

ASCII GS B n

Hexadecimal 1D 42 n

Decimal 29 66 n

Range of *n* 0-255

Default: n = 0

Description:

- When the LSB of *n* is 0, white/black reverse mode is turned off.
- When the LSB of *n* is 1, white/black reverse mode is turned on.
- Only the lowest bit of *n* is valid.
- This command is available for built-in characters and user-defined characters.
- When white/black reverse printing mode is on, it also applied to character spacing set by **ESC SP**.
- This command does not affect bit image, user-defined bit image, bar code, HRI characters, and spacing skipped by **HT**, **ESC \$**, and **ESC **.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

TURN EMPHASIZED MODE ON/OFF

Synopsis: Turn emphasized mode on/off.

ASCII ESC E *n*

Hexadecimal 1B 45 **n**

Decimal 27 69 *n*

Range of n 0-255

Description: Turns emphasized mode on or off.

When the LSB (least significant bit) of *n* is 1, emphasized mode is turned on.

When it is 0, emphasized mode is turned off.

- Only the least significant bit of *n* is enabled.
- This command and **ESC !** turn on and off emphasized mode in the same way. Be careful when this command is used with **ESC !**.

Default: *n* = 0

See also: ESC !

TURN DOUBLE-STRIKE MODE ON/OFF

Synopsis: Turn double-strike mode on/off.

ASCII ESC G *n*

Hexadecimal 1B 47 **n**

Decimal 27 71 *n*

Range of n 0-255

Description: Turns double-strike mode on or off.

- When the LSB (least significant bit) of *n* is 1, double-strike mode is turned on.

- When it is 0, double-strike mode is turned off.

- Only the lowest bit of *n* is enabled.

- Printer output is the same in double-strike mode and in emphasized mode.

Default: *n* = 0

See also: ESC E

TURN 90° CLOCKWISE ROTATION MODE ON/OFF

Synopsis: Turn 90° clockwise rotation mode on/off.

ASCII ESC V n

Hexadecimal 1B 56 n

Decimal 27 86 n

Range: $0 \leq n \leq 2$, $48 \leq n \leq 50$

Description: Turns 90° clockwise rotation mode on/off.

- This command affects printing in standard mode. However, the setting is always effective.
- When underline mode is turned on, the printer does not underline 90° clockwise rotated.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double-width commands in normal mode.

n is used as follows:

n	Function (TMT-T88 III)	Function (TMT-T90)
0, 48	Turns off 90° clockwise rotation mode	
1, 49	Turns on 90° clockwise rotation mode	
2, 50		Turns on 90° clockwise rotation mode

Default: n = 0

See also: ESC !, ESC -

TURN ON/OFF UPSIDE-DOWN PRINTING MODE

Synopsis: Turn on/off upside-down printing mode.

ASCII ESC { *n*

Hexadecimal **1B** **7B** **n**

Decimal 27 123 *n*

Range of n: 0-255

Description: Turns upside-down printing mode on or off.

- When the LSB of *n* is 0, upside-down printing mode is turned off.
- When the LSB of *n* is 1, upside-down printing mode is turned on.
- Only the lowest bit of *n* is valid.
- This command is enabled only when processed at the beginning of a line in standard mode.
- When this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.

In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

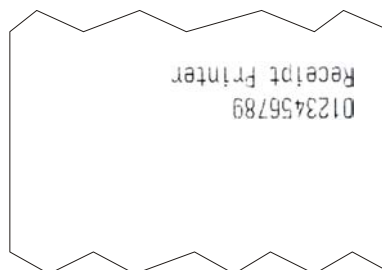
Default: *n* = 0

Example:

When upside-down printing mode is not selected



When upside-down printing Mode is selected



Paper feed direction

SELECT CHARACTER SIZE

Synopsis: Select character size.

ASCII GS ! *n*

Hexadecimal 1D 21 **n**

Decimal 29 33 *n*

Range of n: 0-255

(vertical number of times = 1-8, 1 horizontal number of times = 1-8)

Description: Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

Bit	Off/On	Hex	Decimal	Function
0				Character height selection. See Table 2.
1				
2				
3				
4				Character width selection. See Table 1.
5				
6				
7				

Table 1 Character Width Selection

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (double-width)
20	32	3
30	48	4
40	64	5
50	80	6
60	96	7
70	112	8

Table 2 Character Height Selection

Hex	Decimal	Height
00	0	1 (normal)
01	1	2 (double-height)
02	2	3
03	3	4
04	4	5
05	5	6
06	6	7
07	7	8

- This command is all characters effective except for HRI characters.
- If *n* is outside of the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.
- In page mode, vertical and horizontal directions are based on the character orientation.
- When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
- The ESC ! command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

Default: *n* = 0

See also: ESC !

SELECT CHARACTER STYLE (ONLY TM-T90 EMULATION)

Synopsis: Select character style (only Tm-T90 emulation).

ASCII GS (N pL pH fn [parameter]

Description: • Executes commands for the character style as specified by the function code *fn*.

<i>fn</i>	Format	Function No.	Description
48	GS (N <i>pL pH fn m</i>	Function 48	Selects character color.

(FUNCTION 48)

Synopsis: Select character style (only Tm-T90 emulation).

ASCII GS (L pL pH m fn kc1 kc2 b x y (fn = 69)

Hexadecimal 1D 28 4E pL pH fn m

Decimal 29 40 78 pL pH fn m

Range: $(pL + pH \times 256) = 2$ ($pL = 2$, $pH = 0$)
 $fn = 48$
 $m = 49$ (when the monochrome paper is selected)
 $m = 49, 50$ (when the two-color paper is selected)

Description: • Prints characters in the color specified by *m*.

<i>m</i>	Color
49	Color 1
50	Color 2

- Color 1 means black (high level of energy) in the specified two-color thermal paper.
- Color 2 means red (low level of energy) in the specified two-color thermal paper.

TURNS SMOOTHING MODE ON/OFF

Synopsis: Turns smoothing mode on/off.

ASCII GS b *n*

Hexadecimal 1D 62 **n**

Decimal 29 98 *n*

Range of n: 0-255

Description: Turns smoothing mode on or off.

When the LSB of *n* is 0, smoothing mode is turned off.

When the LSB of *n* is 1, smoothing mode is turned on.

- Only the lowest bit of *n* is valid.
- Smoothing mode is available for built-in, user-defined characters.
- Even if smoothing mode is turned on, smoothing is not performed when either of character width or character height is the normal size.

Default: $n = 0$

See also: GS : ESC !, GS !

6.6 Graphics commands

SELECT BIT-IMAGE MODE

Synopsis: Select bit-image mode.

ASCII ESC * *m* *nL* *nH* *d1...dk*

Hexadecimal 1B 2A **m** **nL** **nH** **d1...dk**

Decimal 27 42 *m* *nL* *nH* *d1...dk*

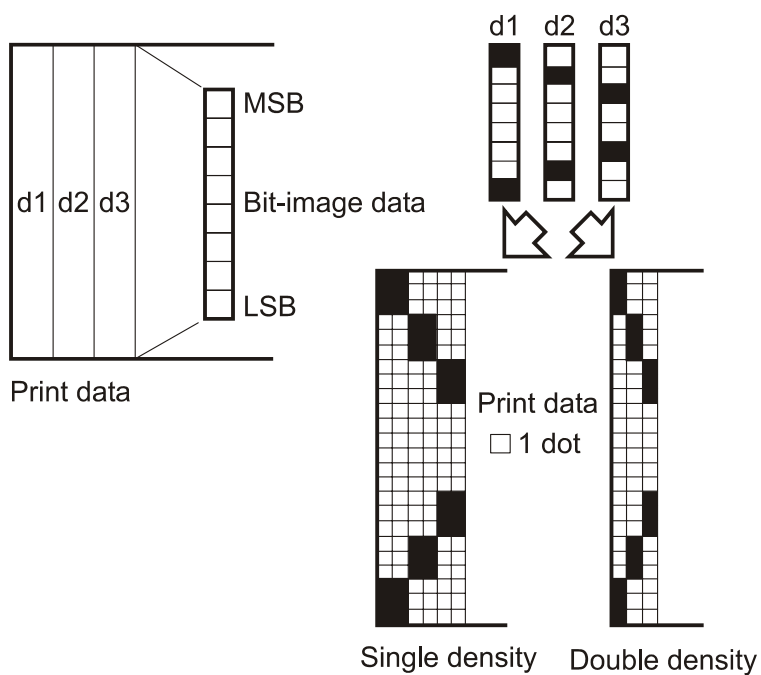
Range :
m = 0, 1, 32, 33
nL = 0-255
nH = 0-3
d = 0-255

Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

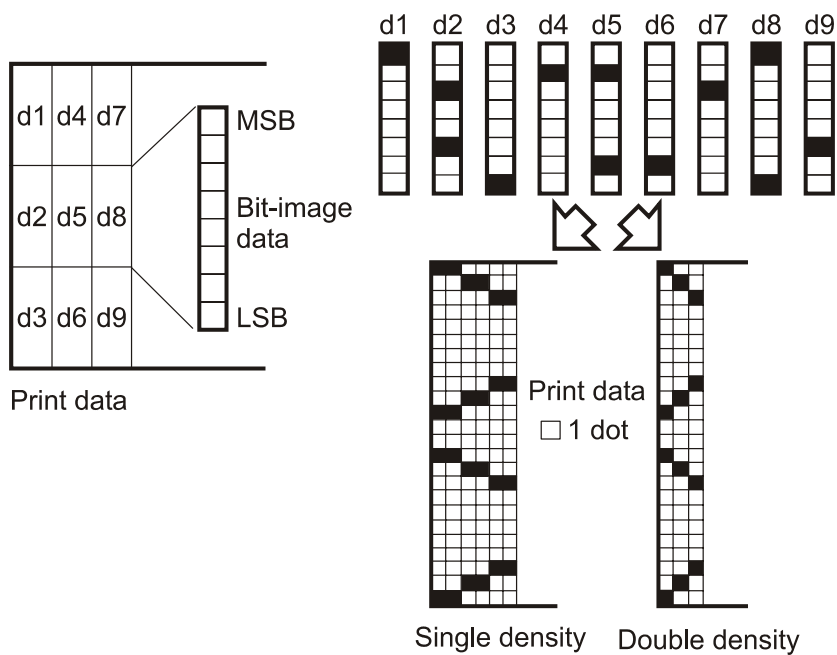
m	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density (dot/mm)	Dot Density (dot/mm)	Maximum Number of Dots
0	8-dot single-density	8	2	4	$nL + nH \times 256$
1	8-dot double-density	8	2	8	$nL + nH \times 256$
32	24-dot single-density	24	8	4	$(nL + nH \times 256) \times 3$
33	24-dot single-density	24	8	8	$(nL + nH \times 256) \times 3$

- Description:**
- If the value of *m* is out of the specified range, *nL* and data following are processed as normal data.
 - The *nL* and *nH* indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by $nL + nH \square 256$.
 - If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
 - The number of dots handled depends on the value of the line length parameter, which can be 560 or 576.
 - *d* indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
 - If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
 - (1) The width of the printing area is extended to the right to accommodate the amount of data.
 - (2) If step (1) does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
 - After printing a bit image, the printer returns to normal data processing mode.
 - This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
 - Refer to Figure 2 for the bit image development position in page mode.
 - The relationship between the image data and the dots to be printed is as follows:

- When 8-dot bit image is selected:



- When 24-dot bit image is selected:



PRINT RASTER BIT IMAGE

Synopsis: Print raster bit image.

ASCII GS v 0 m xL xH yL yH d1....dk

Hexadecimal 1D 76 30 m xL xH yL yH d1....dk

Decimal 29 118 48 m xL xH yL yH d1....dk

Range: $m = 0-3, m = 48-51$

$xL = 0-255$

$xH = 0-255$

$yL = 0-255$

$yH = 0-8$

$1 \leq (yL + yH \times 256) \leq 2303$

$yH = 0-15$

$1 \leq (yL + yH \times 256) \leq 4095$ (Only TM-T90 emulation)

$d = 0-255$

$k = (xL + xH \times 256) \times (yL + yH \times 256) \quad (k \neq 0)$

Description: Selects Raster bit-image mode. The value of m selects the mode, as follows:

TM-T88 III emulation.			
m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	8 dots/mm	8 dots/mm
1, 49	Double-width	8 dots/mm	4 dots/mm
2, 50	Double-height	4 dots/mm	8 dots/mm
3, 51	Quadruple	4 dots/mm	4 dots/mm

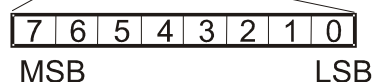
TM-T90 emulation.			
m	Mode	Vertical dot density	Horizontal dot density
0, 48	Normal	180 dpi	180 dpi
1, 49	Double-width	180 dpi	90 dpi
2, 50	Double-height	90 dpi	180 dpi
3, 51	Quadruple	90 dpi	90 dpi

- xL, xH , select the number of data bytes ($xL+xH \times 256$) in the horizontal direction for the bit image.
- yL, yH , select the number of data bytes ($yL+yH \times 256$) in the vertical direction for the bit image.

When $x_L + x_H \times 256 = 64$

← $(xL + xH \times 256) \times 8 \text{dots} = 560 \text{ dots}$

1	2	3		62	63	64
65	66	67		126	127	128
						
				K-2	K-1	K

$$YL + yH \times 256\text{dots}$$


- **Selected Commands:**

SELECT AN INTERNATIONAL CHARACTER SET

Synopsis: Select an international character set.

ASCII ESC R n

Hexadecimal	1B	52	n
-------------	----	----	---

Decimal	27	82	n
----------------	----	----	---

Range of n 0-10

Default: $n = 0$

n	Country
0	USA
1	France
2	Germany
3	UK
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korean

Description: Selects an international character set **n** from the table above.

See also: [International Character Set](#)

SELECT CHARACTER CODE TABLE

Synopsis: Select character code table.

ASCII ESC t n

Hexadecimal 1B 74 n

Decimal 27 116 n

Range: n = 0-5
 n = 16-26, 128-142
 n = 255

Description: Select a page n from the character code table.

n	Page
0	PC437 [U.S.A., Standard Europe]
1	Ignored
2	CP 850 [Multilingual]
3	CP 860 [Portuguese]
4	CP 863 [Canadian-French]
5	CP 865 [Nordic]
16	WPC1252 [Latin I]
17	CP 866 [Cyrillic #2]
18	CP 852 [Latin2]
19	CP 858 [[Multilingual + Euro]
20	Ignored
21	Ignored
22	Ignored
23	Ignored
24	Ignored
25	Ignored
26	Ignored
128	CP 864 [Arabic]
129	CP 857 [Turkish]
135	CP 210 [Greek]
136	CP 862 [Israel]
137	WPC 1255 [Israel]
138	WPC 1257 [Baltic]
139	Ignored
140	WPC 1253 [Greek]
141	WPC 1254 [Turkish]
142	WPC 1251 [Cyrillic]
255	Space page

Default: n = 0

See also: Character set

SELECT/CANCEL USER-DEFINED CHARACTER SET

Synopsis: Select/cancel user-defined character set.

ASCII ESC % n

Hexadecimal **1B** **25** **n**

Decimal 27 37 n

Range of *n* 0-255

Description: Selects or cancels the user-defined character set.

- When the LSB of *n* is 0, the user-defined character set is canceled.
- When the LSB of *n* is 1, the user-defined character set is selected.
- When the user-defined character set is canceled, the internal character set is automatically selected.
- **n** is available only for the least significant bit.

Default: n = 0

See also: ESC &, ESC ?

DEFINE USER-DEFINED CHARACTERS

Synopsis: Define user-defined characters.

ASCII	ESC	&	y	c1	c2 [x1 d1...d(y × x1)]...[xk d1 ... d(y × xk)]
Hexadecimal	1B	26	y	c1	c2 [x1 d1...d(y × x1)]...[xk d1 ... d(y × xk)]
Decimal	27	38	y	c1	c2 [x1 d1...d(y × x1)]...[xk d1 ... d(y × xk)]

Range :

- y=3
- c1-c2=32-126
- x=0-12 (when font A (12 × 24) is selected)
- x=0-9 (when font B (9 × 17) is selected)
- d1...d(y × xk) =0-255

Description: Defines user-defined characters

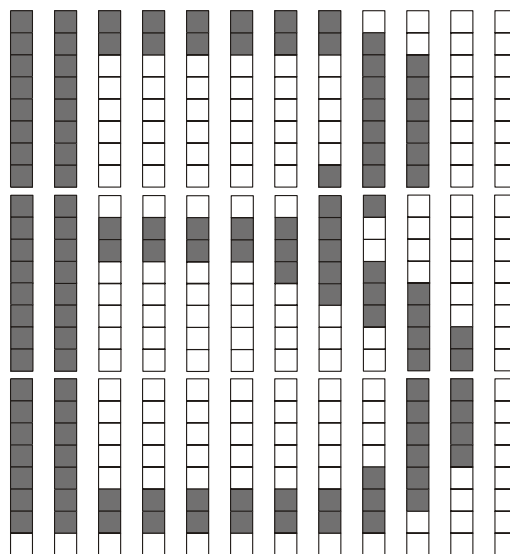
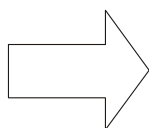
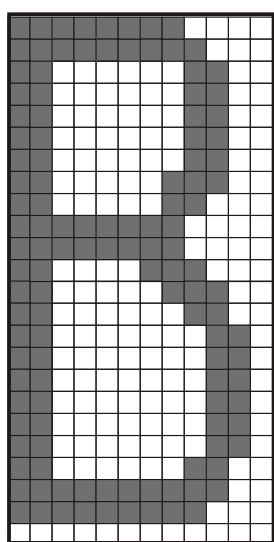
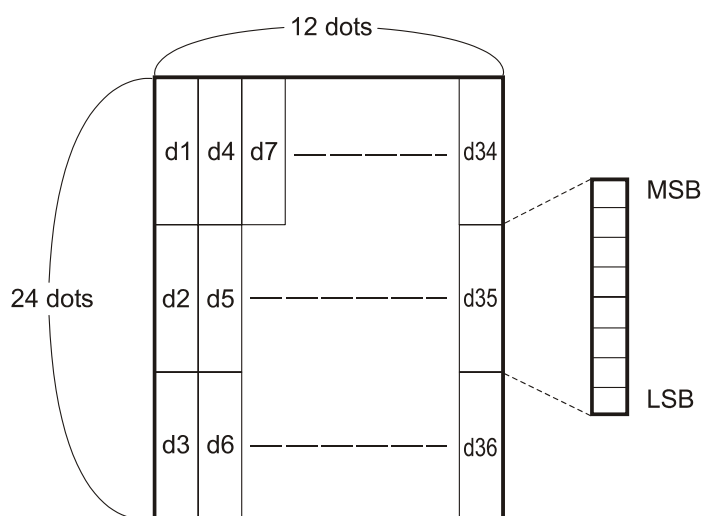
- y specifies the number of bytes in the vertical direction.
- c1 specifies the beginning character code for the definition, and c2 specifies the final code.
- x specifies the number of dots in the horizontal direction.
- The allowable character code range is from ASCII code <20>H to <7E>H (95 characters).
- It is possible to define multiple characters for consecutive character codes. If only one character is desired, use c1 = c2.
- d is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.
- The data to define a user-defined character is (y × x) bytes.
- Set a corresponding bit to 1 to print a dot or 0 to not print a dot.
- This command can define different user-defined character patterns by each fonts. To select a font, use **ESC !**
- A user-defined character and a downloaded bit image cannot be defined simultaneously. When this command is executed, the downloaded bit image is cleared.
- The user-defined character definition is cleared when:
 - (3) **ESC @** is executed.
 - (4) **FS q** is executed.
 - (5) **GS** is executed.
 - (6) **ESC ?** is executed.
 - (7) The printer is reset or the power is turned off.
- When the user-defined characters are defined in font B (9 x17), only the most significant bit of the 3rd byte of data in vertical direction is effective.

Default: The international character set

See also: ESC %, ESC ?

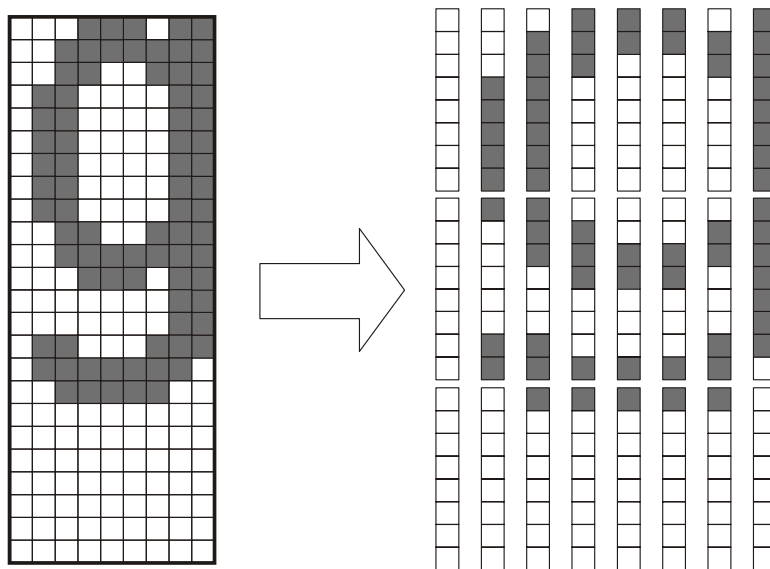
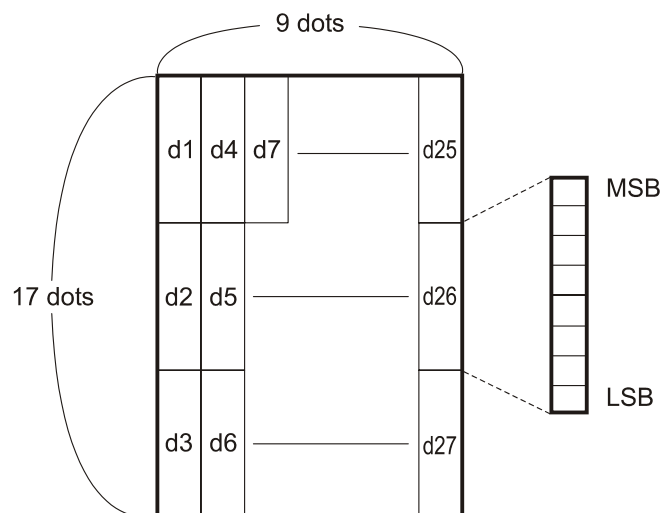
Example:

- When font A (12 x24) is selected.



d1 = <FF>H	d4 = <FF>H	d7 = <C0>H
d2 = <FF>H	d5 = <FF>H	d8 = <60>H
d3 = <FE>H	d6 = <FE>H	d9 = <06>H

- When font B (9 × 17) is selected.



d1 = <00>H	d4 = <1F>H	d7 = <7F>H ...
d2 = <00>H	d5 = <83>H	d8 = <E3>H ...
d3 = <00>H	d6 = <00>H	d9 = <80>H ...

CANCEL USER-DEFINED CHARACTERS

Synopsis:	Cancel user-defined characters.		
ASCII	ESC	?	<i>n</i>
Hexadecimal	1B	3F	n
Decimal	27	63	<i>n</i>
Range of <i>n</i>:	32-126		
Description:	Cancels user-defined characters. • This command cancels the pattern defined for the character code specified by <i>n</i>. After the user-defined character is canceled, the corresponding pattern for the internal character is printed. • This command deletes the pattern defined for the specified code in the font selected by ESC !. • If a user-defined character has not been defined for the specified character code, the printer ignores this command.		
See also:	ESC &, ESC %		

SELECT CHARACTER FONT

Synopsis:	Select character font.		
ASCII	ESC	M	<i>n</i>
Hexadecimal	1B	4D	n
Decimal	27	77	<i>n</i>
Range:	<i>n</i> = 0, 1, 48, 49		
n	Function		
0, 48	Character font A (12 x 24) selected.		
1, 49	Character font B (9 x 17) selected.		
Description:	Selects character fonts. • The ESC ! command can also select the character fonts. However, the setting of the last received command is effective.		
See also:	ESC !		

6.8 Logo commands

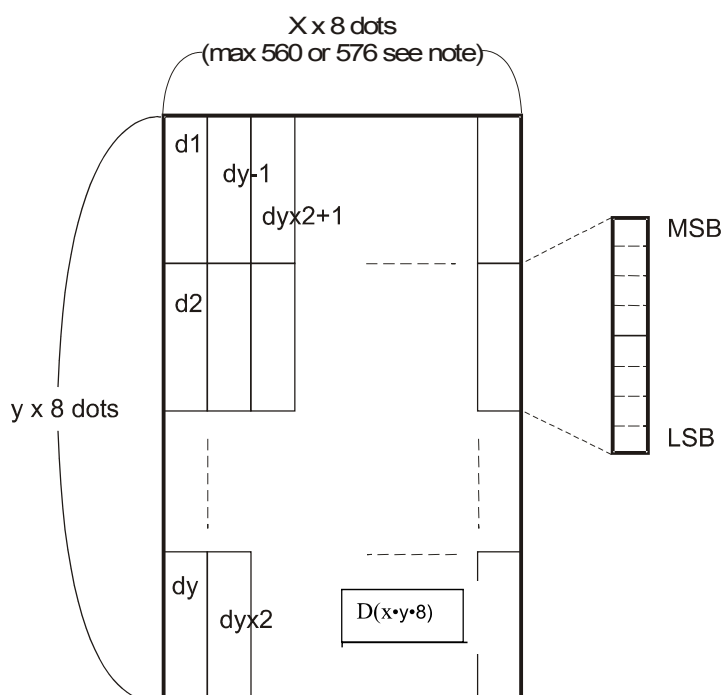
- Download commands :

DEFINE DOWNLOADED BIT IMAGE

Synopsis:	Define downloaded bit image.				
ASCII	GS	*	x	y	d1...d (<i>x x y x x 8</i>)
Hexadecimal	1D	2A	x	y	d1...d (<i>x x y x x 8</i>)
Decimal	29	42	x	y	d1...d
Range :	<i>x</i> = 1-255 <i>y</i> = 1-48 <i>x</i> × <i>y</i> ≤ 1536 <i>d</i> = 0-255				

- Description:** Defines a downloaded bit image using the number of dots specified by x and y .
- x specifies the number of dots in the horizontal direction (divided by 8).
 - y specifies the number of dots in the vertical direction (divided by 8).
 - The number of dots in the horizontal direction is $x \times 8$, in the vertical direction it is $y \times 8$.
 - If $x \times y$ is out of the specified range, this command is disabled.
 - The d indicates bit-image data. Data (d) specifies a bit printed to 1 and not printed to 0.
 - The downloaded bit image definition is cleared when:
 1. **ESC @** is executed
 2. **ESC &** is executed.
 3. **FS q** is executed.
 4. Printer is reset or the power is turned off.

See also: The following figure shows the relationship between the downloaded bit image and the printed data GS /



Note: If the line length is set to 43/57, the maximum resolution is 576 dots.

CUSTOMIZE NV MEMORY AREA (ONLY TM-T90 EMULATION)

Synopsis: Customize Nv memory area (only Tm-T90 emulation).

ASCII GS (E pL pH fn [parameter]

Description:

- Read the NV user memory area format. The table below explains the functions available in this command. Executes commands related to the user setting mode by specifying the function code *fn*.

<i>fn</i>	Format	No.	Function
1	GS (E pL pH <i>fn</i> d1 d2	1	Changes into the user setting mode
2	GS (E pL pH <i>fn</i> d1 d2 d3	2	Ends the user setting mode session.
6	GS (E pL pH <i>fn</i> a	6	Reads back the customized value settings.

- pL*, *pH* specifies ($pL + pH \times 256$) as the number of bytes after *pH* (*fn* and [parameter]).
- The user setting mode is a special mode to change the values in the NV user memory with this command. Only reading is currently implemented.
- The customized values can be known with Function 6 even though the printer does not enter the user setting mode.

Notes:

- Frequent write commands by this command, may damage the NV memory. Therefore, it is recommended to write to NV memory no more than 10 times a day.
- While processing this command, the printer is BUSY while writing data to the user NV memory and stops receiving data. Therefore it is prohibited to transmit data including the real-time commands during the execution of this command.

(FUNCTION 1)

Synopsis: Customize Nv memory area (only Tm-T90 emulation).

ASCII GS (E pL pH *fn* d1 d2 (*fn* = 1)

Hexadecimal 1D 28 45 pL pH fn d1 d2

Decimal 29 40 69 pL pH fn d1 d2

Range: ($pL + pH \times 256$) = 3 ($pL = 3$, $pH = 0$)
fn = 1
d1 = 73
d2 = 78

Description: Enters the user setting mode and reply as follow:

	Hexadecimal	Decimal	Number of Data
Header	37H	55	1 byte
Flag	20H	32	1 byte
NUL	00H	0	1 byte

(FUNCTION 2)

Synopsis: Customize Nv memory area (only Tm-T90 emulation).

ASCII GS (E pL pH *fn* d1 d2 d3 (*fn* = 2)

Hexadecimal 1D 28 45 pL pH fn d1 d2 d3

Decimal 29 40 69 pL pH fn d1 d2 d3

Range: ($pL + pH \times 256$) = 4 ($pL = 4$, $pH = 0$)
fn = 2
d1 = 79
d2 = 85
d3 = 84

Description: Ends the user setting mode.

(FUNCTION 6)

Synopsis: Customize Nv memory area (only Tm-T90 emulation).

ASCII GS (E pL pH fn a ($fn = 6$))

Hexadecimal 1D 28 45 pL pH fn a

Decimal 29 40 69 pL pH fn a

Range: ($pL + pH \times 256$) = 2 ($pL = 2, pH = 0$)
 $fn = 6$
 $a = 1, 2, 116$

Description: • Transmits the customized value corresponding to the number specified by a .
 Reply format is:

	Hex	Decimal	Amount of Data
Header	37H	55	1 byte, fixed to 37H
Flag	27H	39	1 byte, fixed to 27H
Customized value number	30H – 39H	48 – 57	1 – 3 bytes
Separator	1FH	31	1 byte, fixed to 1FH
Customized value	30H – 39H	48 – 57	1 – 5 bytes
Terminator	00H	0	1 byte, fixed to NUL

- The customized value number is as follows:

a	Transmitted data		
	1st byte	2nd byte	3rd byte
1	49	--	--
2	50	--	--
116	49	49	54

- Configuration of the customized value
 When the NV user memory capacity ($a = 1$) is specified:

Setting status		Transmission data				
Reply	Memory capacity	1 st byte	2 nd byte	3 rd byte	4 th byte	5 th byte
1	1 KB	49	--	--	--	--
2	64 KB	50	--	--	--	--
3	128 KB	51	--	--	--	--
4	192 KB	52	--	--	--	--

- When the NV graphics memory capacity ($a = 2$) is specified:

Setting status		Transmission data				
Reply	Memory capacity	1 st byte	2 nd byte	3 rd byte	4 th byte	5 th byte
1	None	49	--	--	--	--
2	64 KB	50	--	--	--	--
3	128 KB	51	--	--	--	--
4	192 KB	52	--	--	--	--
5	256 KB	53	--	--	--	--
6	320 KB	54	--	--	--	--
7	384 KB	55	--	--	--	--

- When the type of paper ($a = 116$) is specified:

Setting status		Transmission data				
Reply	Print control method	1 st byte	2 nd byte	3 rd byte	4 th byte	5 th byte
1	Monochrome paper	49	--	--	--	--
257	Two-color paper	50	53	55	--	--

SELECT GRAPHICS DATA (ONLY TM-T90 EMULATION)

Synopsis: Select graphics data (only Tm-T90 emulation).

ASCII GS (L pL pH m fn [parameter] GS 8 L p1 p2 p3 p4 m fn [parameter]

Hexadecimal 1D 28 4C pL pH m fn [parameter] 1D 38 4C p1 p2 p3 p4 m fn [parameter]

Decimal 29 40 76 pL pH m fn [parameter] 29 56 76 p1 p2 p3 p4 m fn [parameter]

- Description:**
- In the description below **GS (L** is used for the explanation.
 - Note that **GS (L** and **GS 8 L** have the same Function.
 - If the [parameter] of each format exceeds 65533 bytes use **GS 8 L**.
 - Processes graphics data according to the function code *fn*.

<i>fn</i>	Format	Function No.	Function
0, 48	GS (L pL pH m fn	Function 48	Transmits the NV graphics memory capacity.
2, 50	GS (L pL pH m fn	Function 50	Prints the graphics data in the print buffer.
3, 51	GS (L pL pH m fn	Function 51	Transmits the remaining capacity of the NV graphics memory.
64	GS (L pL pH m fn d1 d2	Function 64	Transmits the defined NV graphics key code list.
65	GS (L pL pH m fn d1 d2 d3	Function 65	Deletes all NV graphics data.
66	GS (L pL pH m fn kc1 kc2	Function 66	Deletes the specified NV graphics data.
67	GS (L pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]l...[c d1...dk]b	Function 67	Defines the raster graphics data the non-volatile memory.
69	GS (L pL pH m fn kc1 kc2 x y	Function 69	Prints the specified NV graphics data.
112	GS (L pL pH m fn a bx by c xL xH yL yH d1...dk	Function 112	Stores the raster graphics data in the print buffer memory.

- pL*, *pH* specifies ($pL + pH \times 256$) as the number of bytes after *pH* (*m*, *fn*, and [parameter]).

Notes:	- Frequent write command executions by this command may damage the NV memory. Therefore, it is recommended to write to the NV memory no more than 10 times a day. - While processing this command, the printer is BUSY while writing data to the NV graphics memory and stops receiving data. Therefore it is prohibited to transmit data including the real-time commands during the execution of this command.
---------------	---

(FUNCTION 48)

Synopsis: Select graphics data (only Tm-T90 emulation).

ASCII GS (L pL pH m fn (fn = 0, 48)

Hexadecimal 1D 28 4C pL pH m fn

Decimal 29 40 76 pL pH m fn

Range: $(pL + pH \times 256) = 2$ ($pL = 2$, $pH = 0$)
 $m = 48$
 $fn = 0, 48$

Description: • Transmits the total capacity of the NV bit-image memory (number of bytes in the memory area).

	Hexadecimal	Decimal	Number of Data
Header	37H	55	1 byte
Flag	30H	48	1 byte
Data	30H - 39H	48 - 57	1 - 8 byte
NUL	00H	0	1 byte

- The total capacity data is converted to character codes corresponding to decimal data, then transmitted from the MSB.
- The data length is variable.
- The total capacity of the NV user memory is selectable as any one of [0, 64K, 128K, 192K, 256K, 320K, 384K] bytes with **GS (E**. The default value is 384 KB.

(FUNCTION 50)

Synopsis: Select graphics data (only Tm-T90 emulation).

ASCII GS (L pL pH m fn (fn = 2, 50)

Hexadecimal 1D 28 4C pL pH m fn

Decimal 29 40 76 pL pH m fn

Range: $(pL + pH \times 256) = 2$ ($pL = 2$, $pH = 0$)
 $m = 48$
 $fn = 2, 50$

Description: • Prints the buffered graphics which is stored by the process of Function 112.
 • Feeds paper by the amount corresponding to the number of dots in the y direction of the buffered graphics.

(FUNCTION 51)

Synopsis: Select graphics data (only Tm-T90 emulation).

ASCII GS (L pL pH m fn (fn = 3, 51)

Hexadecimal 1D 28 4C pL pH m fn

Decimal 29 40 76 pL pH m fn

Range: $(pL + pH \times 256) = 2$ ($pL = 2$, $pH = 0$)
 $m = 48$
 $fn = 3, 51$

Description: • Transmits the number of bytes of remaining memory (unused area) in the NV user memory.

	Hexadecimal	Decimal	Number of Data
Header	37H	55	1 byte
Flag	31H	49	1 byte
Data	30H - 39H	48 - 57	1 - 8 byte
NUL	00H	0	1 byte

- The number of bytes of remaining memory is converted to character codes corresponding to decimal data, then transmitted from the MSB.
- The data length is variable.

(FUNCTION 64)

Synopsis: Select graphics data (only Tm-T90 emulation).
ASCII GS (L pL pH m fn d1 d2 (fn = 64)

Hexadecimal 1D 28 4C pL pH m fn d1 d2

Decimal 29 40 76 pL pH m fn d1 d2

Range: $(pL + pH \times 256) = 4$ ($pL = 4, pH = 0$)
 $m = 48$
 $fn = 64$
 $d1 = 75$
 $d2 = 67$

Description:

- Transmits the defined NV graphics key code list.
- When the key code is present:

	Hexadecimal	Decimal	Number of Data
Header	37H	55	1 byte
Flag	72H	114	1 byte
Status	40H or 41H	64 or 65	1 byte
Data	30H - 39H	48 - 57	2 - 80 byte
NUL	00H	0	1 byte

- When the key code is not present:

	Hexadecimal	Decimal	Number of Data
Header	37H	55	1 byte
Flag	72H	114	1 byte
Status	40H	64	1 byte
NUL	00H	0	1 byte

- If the number of the key code exceeds 40, the key code is transmitted dividing up to 40.
 - The status if the continuous transmission data block is present is 41H.
 - The status if the continuous transmission data block is not present is 40H
- After the [Header – NUL] is transmitted, the printer receives a response from the host; it performs the process defined by the response. (See the tables below).
 When the status (existence of the next data block) is
 Hexadecimal = 41H / Decimal = 65

Response		Process performed
ASCII	Decimal	
ACK	6	Transmits the next data
NAK	21	Transmits the last data again
CAN	24	Ends the process

- When the status (for the last data block) is
Hexadecimal = 40H / Decimal = 64

Response		Process performed
ASCII	Decimal	
ACK	6	Ends the process
NAK	21	Transmits the last data again
CAN	24	Cancels the process

(FUNCTION 65)

Synopsis: Select graphics data (only Tm-T90 emulation).
ASCII GS (L pL pH m fn d1 d2 (fn = 65)

Hexadecimal 1D 28 4C pL pH m fn d1 d2 d3
Decimal 29 40 76 pL pH m fn d1 d2 d3

Range: $(pL + pH \times 256) = 5$ ($pL = 5$, $pH = 0$)
 $m = 48$
 $fn = 65$
 $d1 = 67$
 $d2 = 76$
 $d3 = 82$

Description: • Deletes all defined NV graphics data.

(FUNCTION 66)

Synopsis: Select graphics data (only Tm-T90 emulation).
ASCII GS (L pL pH m fn kc1 kc2 (fn = 64)

Hexadecimal 1D 28 4C pL pH m fn kc1 kc2
Decimal 29 40 76 pL pH m fn kc1 kc2

Range: $(pL + pH \times 256) = 4$ ($pL = 4$, $pH = 0$)
 $m = 48$
 $fn = 66$
 $32 \leq kc1 \leq 126$
 $32 \leq kc2 \leq 126$

Description: • Deletes the NV graphics data defined by the key codes kc1 and kc2.

(FUNCTION 67)

Synopsis: Select graphics data (only Tm-T90 emulation).

ASCII GS (L pL pH m fn a kc1 kc2 b xL xH yL yH
[c d1...dk]1... [c d1...dk]b

Hexadecimal 1D 28 4C pL pH m fn a kc1 kc2 b xL xH yL yH
[c d1...dk]1... [c d1...dk]b

Decimal 29 40 76 pL pH m fn a kc1 kc2 b xL xH yL yH
[c d1...dk]1... [c d1...dk]b

Range:

- **GS (L** parameter
 $3 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255$, $0 \leq pH \leq 255$)
- **GS 8 L** parameter
 $3 \leq (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leq 4294967295$
 $(0 \leq p1 \leq 255, 0 \leq p2 \leq 255, 0 \leq p3 \leq 255, 0 \leq p4 \leq 255)$
- Common parameter for **GS 8 L** / **GS (L**
 $m = 48$
 $fn = 67$
 $a = 48$
 $32 \leq kc1 \leq 126$
 $32 \leq kc2 \leq 126$
 $b = 1, 2$
 $1 \leq (xL + xH \times 256) \leq 8192$
 $1 \leq (yL + yH \times 256) \leq 2304$
 $c = 49$ (when the monochrome paper is selected)
 $c = 50$ (when the two-color paper is selected)
 $0 \leq d \leq 255$
 $k = (\text{int}((xL + xH \times 256) + 7) / 8) \times (yL + yH \times 256)$
- The total capacity of the NV user memory is selectable as any one of [0, 64K, 128K, 192K, 256K, 320K, 384K] bytes with **GS (E**. The default value is 384 KB.

Description:

- Defines the raster graphics data in the NV graphics area.
- b specifies the number of the color of the defined data.
- xL, xH specifies the defined data in the horizontal direction to $(xL + xH \times 256)$ dots.
- yL, yH specifies the defined data in the vertical direction to $(yL + yH \times 256)$ dots.
- c specifies the color of the defined data.

c	Defined data color
49	Color 1
50	Color 2

- Color 1 means black (high level of energy) in the specified two-color thermal paper.
- Color 2 means red (low level of energy) in the specified two-color thermal paper.

Notes:

- If the color is specified with b and a single color also is specified with c , the printer stops processing the command, and regards the defined data as effective up to the time when the printer stops processing, then disregards the remaining data after it.
- When this command is processed while NV bit image data is defined with **FS q**, the printer deletes all NV bit image data, then defines data with this command.

(FUNCTION 69)

Synopsis:	Select graphics data (only Tm-T90 emulation).										
ASCII	GS	(	L	pL	pH	m	fn	kc1	kc2	b	x y (fn = 69)
Hexadecimal	1D	28	4C	pL	pH	m	fn	kc1	kc2	x	y
Decimal	29	40	76	pL	pH	m	fn	kc1	kc2	x	y

Range:

- $(pL + pH \times 256) = 6$ ($pL = 6, pH = 0$)
- $m = 48$
- $fn = 69$
- $32 \leq kc1 \leq 126$
- $32 \leq kc2 \leq 126$
- $x = 1, 2$
- $y = 1, 2$

Description:

- Prints the NV graphics data defined by the key codes *kc1* and *kc2*. The graphics data is enlarged by *x* and *y* in the horizontal and vertical directions.

(FUNCTION 112)

Synopsis:	Select graphics data (only Tm-T90 emulation).															
ASCII	GS	(	L	pL	pH	m	fn	a	bx	by	c	xL	xH	yL	yH	d1...dk (fn = 112)
Hexadecimal	1D	28	4C	pL	pH	m	fn	a	bx	by	c	xL	xH	yL	yH	d1...dk
Decimal	29	40	76	pL	pH	m	fn	a	bx	by	c	xL	xH	yL	yH	d1...dk

Range:

- GS (L parameter**
 $11 \leq (pL + pH \times 256) \leq 65535$ ($0 \leq pL \leq 255, 0 \leq pH \leq 255$)
- GS 8 L parameter**
 $11 \leq (p1 + p2 \times 256 + p3 \times 65536 + p4 \times 16777216) \leq 4294967295$
 $(0 \leq p1 \leq 255, 0 \leq p2 \leq 255, 0 \leq p3 \leq 255, 0 \leq p4 \leq 255)$
- Common parameter for GS 8 L / GS (L**
 $m = 48$
 $fn = 112$
 $a = 48$
 $bx = 1, 2$
 $by = 1, 2$
 $c = 49$ (when the monochrome paper is selected)
 $c = 49, 50$ (when the two-color paper is selected)
 $1 \leq (xL + xH \times 256) \leq 1024$

When single-color paper is specified:

$$1 \leq (yL + yH \times 256) \leq 1662 \text{ (when } by = 1)$$

$$1 \leq (yL + yH \times 256) \leq 831 \text{ (when } by = 2)$$

When two-color paper is specified:

$$1 \leq (yL + yH \times 256) \leq 831 \text{ (when } by = 1)$$

$$1 \leq (yL + yH \times 256) \leq 415 \text{ (when } by = 2)$$

$$0 \leq d \leq 255$$

$$k = (\text{int}((xL + xH \times 256) / 8) \times (yL + yH \times 256))$$

Description:

- Stores the raster graphics data, enlarged by *bx* and *by* in the horizontal and vertical directions to the print buffer.
 - *xL*, *xH* specifies the raster graphics data in the horizontal direction as $(xL + xH \times 256)$ dots.
 - *yL*, *yH* specifies the raster graphics data in the vertical direction as $(yL + yH \times 256)$ dots.
 - *c* specifies the color of the defined data.

<i>c</i>	Printing color
49	Color 1
50	Color 2

- Color 1 means black (high level of energy) in the specified two-color thermal paper.
- Color 2 means red (low level of energy) in the specified two-color thermal paper.

Notes:

- In the standard mode, each color can be defined only once.

PRINT DOWNLOADED BIT IMAGE

Synopsis: Print downloaded bit image.

ASCII GS / *m*

Hexadecimal 1D 2F **m**

Decimal 29 47 *m*

Range:

m = 0-3

m = 48-51

Operand:

m= mode selection

Value of <i>m</i>	Print Mode	Vertical Dot Density	Horizontal Dot Density
0,48	Normal	18 dot/mm	8 dot/mm
1,49	Double-width	8 dot/mm	4 dot/mm
2,50	Double-height	4 dot/mm	8 dot/mm
3,51	Quadruple	4 dot/mm	4 dot/mm

Description:

Prints a downloaded bit image using the mode specified by *m*.

- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- If the printing area width set by **GS L** and **GS W** is less than one line in vertical, the following processing is performed only on the line in question:
 1. The printing area width is extended to the right up to one line in vertical. In this case, printing does not exceed the printable area.
 2. If the printing area width cannot be extended by one line in vertical, the left margin is reduced to accommodate one line in vertical.

See also:

GS *

PRINT NV BIT IMAGE

Synopsis: Print NV bit image.

ASCII	FS	p	<i>n</i>	<i>m</i>
Hexadecimal	1C	70	n	m
Decimal	28	112	<i>n</i>	<i>m</i>

Range:

n = 0-255
m = 0-3
m = 48-51

Description: Prints a NV bit image *n* using the mode specified by *m*.

<i>m</i>	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	8dots/mm	8dots/mm
1, 49	Double-width	8dots/mm	4dots/mm
2, 50	Double-height	4dots/mm	8dots/mm
3, 51	Quadruple	4dots/mm	4dots/mm

[dpi: dots per 25.4 mm {1"}]

- *n* is the number of the NV bit image (defined using the **FS q** command).
- *m* specifies the bit image mode.
- NV bit image means a bit image that is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- This command is not effective when the specified NV bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- In page mode, this command is not effective.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (*m*=0, 48) and in double-height mode (*m*=2, 50), and it means 2 dots in double-width mode (*m*=1, 49) and in quadruple mode (*m*=3, 51).
 1. The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
 2. If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- This command feeds dots (for the height *n* of the NV bit-image) in normal and double-width modes, and (for the height *n* × 2 of the NV bit-image) in double-height and quadruple modes, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

See also: ESC *, FS q, GS /, GS v 0

DEFINE NV BIT IMAGE

Synopsis: Define Nv bit image.

ASCII FS q n [xL xH yL yH d1...dk] 1...[xL xH yL yH d1...dk] n

Hexadecimal 1C 71 n [xL xH yL yH d1...dk] 1...[xL xH yL yH d1...dk] n

Decimal 28 113 n [xL xH yL yH d1...dk] 1...[xL xH yL yH d1...dk] n

Range:
n = 1-255
xL = 0-255
xH = 0-3 (when (xL + xH × 256) = 1-1023)
yL = 0-255
yH = 0-1 (when (yL + yH × 256) = 1-288)
d = 0-255
k = (xL + xH × 256) × (yL + yH × 256) × 8
Total defined data area = 2M bits (384K bytes)

- Description:** Define the NV bit image specified by n.
- n specifies the number of the defined NV bit image.
 - xL, xH specifies (xL + xH × 256) × 8 dots in the horizontal direction for the NV bit image you are defining.
 - yL, yH specifies (yL + yH × 256) × 8 dots in the vertical direction for the NV bit image you are defining.
 - This command cancels all NV bit images that have already been defined by this command. The printer cannot redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
 - From the beginning of the processing of this command till the finish of hardware reset, mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the FEED button, etc.) cannot be performed.
 - During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibited to transmit the data including the real-time commands during the execution of this command.
 - NV bit image means a bit image that is defined in a non-volatile memory by **FS q** and printed by **FS p**.
 - In standard mode, this command is effective only when processed at the beginning of the line.
 - In page mode, this command is not effective.
 - This command is effective when 7 bytes <FS<yH> is processed as a normal value.
 - When the amount of data exceeds the capacity left in the range defined by xL, xH, yL, yH, the printer processes xL, xH, yL, and yH out of the defined range.
 - In the first group of NV bit images, when any of the parameters xL, xH, yL, yH is out of the definition range, this command is disabled.
 - In groups of NV bit images other than the first one, when the printer processes xL, xH, yL, yH out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.
 - The d indicates the definition data. In data (d) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
 - This command defines n as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image n. The total agrees with the number of NV bit images specified by command **FS p**.
 - A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bit image is defined n=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses ([data: (xL + xH × 256) × (yL + yH × 256) × 8] [header :4]) bytes of NV memory.

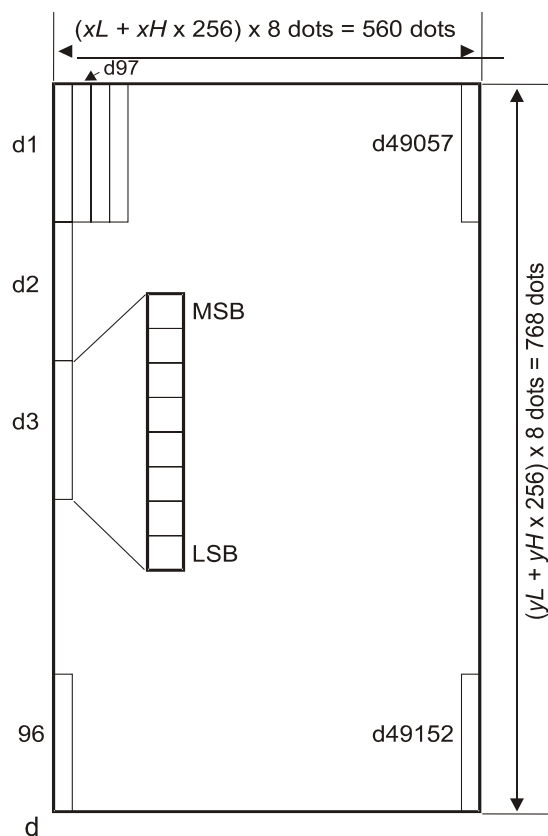
- The definition area in this printer is a maximum of 2M bits (256K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data header] exceeds 2M bytes (256K bytes).
- The printer does not transmit ASB status and perform status detection during processing of this command even when ASB is specified.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

Notes:

- Frequent write command execution may cause damage to the NV memory. Therefore it is recommended to write the NV memory 10 times or less a day.
- The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, SETUP settings are checked again.

See also: FS p

Example When $xL = 64$, $xH = 0$, $yL = 96$, $yH = 0$



6.9 Printer configuration, identification

EXECUTE TEST PRINT

Synopsis:	Execute test print.
ASCII	GS (A pL pH n m
Hexadecimal	1D 28 41 pL pH n m
Decimal	29 40 65 pL pH n m
Range:	(pL+(pH×256))=2 (pL=2, pH=0) n = 0-2, n = 48-50 m = 1-3, m = 49-51

- Description:** Defines a downloaded bit image using the number of dots specified by x and y
- Executes a test print with a specified test pattern on a specified paper.
 - pL and pH specifies the number of the parameter such as n, m to (pL + (pH × 256)) bytes.

n specifies the paper to be tested.

n	Paper
0, 48	Basic sheet (paper roll)
1, 49	Paper roll
2, 50	Paper roll

m specifies a test pattern.

m	Test pattern
1, 49	Hexadecimal dump
2, 50	Printer status print
3, 51	Rolling pattern print

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode.
- When this command is received during macro definition, the printer ends macro definition and begins performing this command.
- After the test print is finished, the printer resets itself automatically. Therefore, the already-defined data before this command is executed, such as an user-defined characters, downloaded bit image, and macro, becomes undefined, and the receive buffer and print buffer are cleared, and each setting returns to the default value. The printer also re-reads the SETUP settings .
- The printer cuts the paper at the end of the test print.
- The printer goes BUSY while this command is executed.

6.10 Printer status commands

These commands enable the printer to communicate with the host computer. They are stored in the printer's data buffer as they are received, and are handled by the firmware in the order in which they were received.

When a fault occurs, the printer will go busy at the communication interface and not respond to either of the Printer Status commands. If the fault causing the busy condition can be cleared, such as by loading paper, or letting the thermal print head cool down, the printer will resume processing the data in its receive buffer.

Real Time commands allow the printer to respond immediately, even though it is busy at the communication interface. See the following section, Real Time Commands, for details about these commands.

TRANSMIT PRINTER ID

Synopsis: Transmit printer Identify.

ASCII GS I *n*

Hexadecimal 1D 49 **n**

Decimal 29 73 *n*

Range:
n = 1-3
n = 49-51
n = 65-68
n = 112

<i>n</i>	Printer ID	Specification (TM-T88 III)	Specification (TM-T90)
1, 49	Printer model ID	TM-T88II series ID (HEX) =20	TM-T90 series ID (HEX) =2EH
2, 50	Type ID	See table below.	
3, 51	ROM version ID	Depends on ROM version.	
65	Firmware version	Depends on Firmware version.	
66	Manufacturer	AXIOHM	
67	Printer name	TM-T88 III	TM-T90
68	Serial number	Depends on serial number (not handled).	
69	Supporting multilingual	Japanese Kanji model: KANJI JAPANESE Chinese Kanji model: CHINA GB2312 Taiwanese Kanji model: TAIWAN BIG-5 Thai character model: THAI 3 PASS Korean Kanji model: KOREA C-5601C	
112	Status of DIP switches		See 'DIP switch status information' on the next sheets

$n = 2$, Type ID

Bit	Off/On	Hex	Decimal	Specification (TM-T88 III)	Specification (TM-T90)
0	Off	00	0	Two-bytes characters not supported.	
	On	01	1	Two-byte characters supported.	
1	Off	00	0	Auto cutter not installed	
	On	02	2	Auto cutter installed.	
2	Off	00	0	Reserved	
3	Off	00	0	Reserved	
4	Off	00	0	Fixed to Off.	
5	Off	00	0	Reserved	
6	Off	00	0	Reserved	
7	Off	00	0	Fixed to Off.	

$n = 112$ (Only TM-T90)

1st byte status information

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Power button enabled
	On	01	1	Power button disabled
1	Off	00	0	Interface condition selection: by setup
	On	02	2	Interface condition selection: not used **
2	Off	00	0	Handshaking: hardware (DTR/DSR)
	On	04	4	Handshaking: software (XON/XOFF)
3	Off	00	0	Serial Data bits: 8
	On	08	8	Serial Data bits: 7
4	Off	00	0	Reserved.
5	Off	00	0	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

** Interface is always programmed by setup. Memory switch are not supported.

2nd byte status information

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Parity: No (Ignore bit 1)
	On	01	1	Parity: Yes (See bit 1)
1	Off	00	0	Parity: Odd
	On	02	2	Parity: Even
2	Off	00	0	Serial Speed (see table below)
	On	04	4	Serial Speed (see table below)
3	Off	00	0	Serial Speed (see table below)
	On	08	8	Serial Speed (see table below)
4	Off	00	0	Reserved.
5	Off	00	0	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

Serial Speed:

Bit 2	Bit 3	Baud
On	On	2400
Off	On	4800
On	Off	9600
Off	Off	19200

Description:

Transmits the printer ID specified by *n*.

- When DTR/DSR control is selected in the serial interface model, the printer transmits the printer ID after confirming that the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.
- When XON/XOFF control is selected in the serial interface model, the printer transmits the printer ID without confirming the condition of the DSR signal.
- The printer ID is transmitted when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When the printer ID transmission is specified with (n = 1-3) or (n = 49-51), one byte code is transmitted.
- When Auto Status Back (ASB) is enabled using **GS a**, the printer ID transmitted by **GS I** and the ASB status must be differentiated using the table in Appendix G.
- After the data is ready to be transmitted, the printer executes the following process.
- When the printer ID transmission is specified with (n = 65-68), the following contents are transmitted: Header: Hexadecimal = 5FH / Decimal = 95 (1 byte) Data: Printer information NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)
 - 1) Executes READY to BUSY. If it is already BUSY, the printer executes nothing.
 - 2) Transmits [Header + Data + NUL].
 - 3) Executes BUSY to READY. If it is already BUSY from any other cause, the printer executes nothing.

See also:

Transmission status identification

TRANSMIT STATUS

Synopsis:

Transmit status.

ASCII **GS** **r** **n**

Hexadecimal **1D** **72** **n**

Decimal 29 114 **n**

Operand:

n = Mode selection

Range:

n = 1, 2, 49, 50

Value of *n*

1, 49 = Transmits paper sensor status

2, 50 = Transmits drawer kick-out connector status

Description:

- When using a serial interface
- When DTR/DSR control is selected, the printer transmits only 1 byte after confirming the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the condition of the DSR signal.
- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated using the table in Appendix G.
- The status types to be transmitted are shown below:

Paper sensor Status ($n = 1$ or $n = 49$)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0, 1	Off	00	0	Paper roll near-end sensor: Paper adequate.
	On	03	3	Paper roll near-end sensor: Paper near end.
2, 3	Off	00	0	Paper roll end sensor: Paper adequate.
	On	(0C)	(12)	Paper roll end sensor: Paper near end.
4	Off	00	0	Not used. Fixed to off.
5, 6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Bits 2 and 3: When the paper end sensor detects a paper end, the printer goes offline and does not execute this command. Therefore, bits 2 and 3 do not transmit the status of paper end.

Drawer Kick out Status ($n = 2$ or $n = 50$)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

See also: DLE EOT, GS a, Transmission status identification

ENABLE/DISABLE AUTOMATIC STATUS BACK (ASB)

Synopsis: Enable/disable automatic status back (ASB).

ASCII GS a n

Hexadecimal 1D 61 n

Decimal 29 97 n

Range: $n = 0-255$

Description: Enables or disables ASB and specifies the status items to include, using n as follows:

Bit	Off/On	Hex	Decimal	Status for ASB (TM-T88 III)	Status for ASB (TM-T90)
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.	
	On	01	1	Drawer kick-out connector pin 3 status enabled.	
1	Off	00	0	Online/offline status disabled.	
	On	02	2	Online/offline status enabled.	
2	Off	00	0	Error status disabled.	
	On	04	4	Error status enabled.	
3	Off	00	0	Paper roll sensor status disabled.	
	On	08	8	Paper roll sensor status enabled.	
4	Off	00	0	Undefined.	Reserved
5	Off	00	0	Undefined.	Reserved
6	Off	00	0	Undefined.	Panel button status disabled

	On	40	64	Undefined.	Panel button status enabled
7	Off	00	0	Undefined.	Reserved

- If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
- If all status items are disabled, the ASB function is also disabled.
- If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission is possible at the first time from when the printer is turned on.
- The following four status bytes are transmitted without confirming whether the host is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.
- Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.
- When the printer is disabled by **ESC** = (Select peripheral device), the four status bytes are transmitted whenever the status changes.
- When using **DLE EOT**, **GS I**, or **GS r**, the status transmitted by these commands and ASB status must be differentiated, according to the procedure in Appendix G, *Transmission Status Identification*.
- The status to be transmitted are as follows:

First byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to Off.
1	Off	00	0	Not used. Fixed to Off.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	04	4	Drawer kick-out connector pin 3 is HIGH.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed by using the PAPER FEED button.
	On	40	64	Paper is being fed by using the PAPER FEED button.
7	Off	00	0	Not used. Fixed to Off.

Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB (TM-T88 III)	Status for ASB (TM-T90)
0	Off	00	0	Undefined.	Not in online waiting status.
	On	01	1	Undefined.	During online waiting status.
1	Off	00	0	Undefined.	Panel button OFF.
	On	02	2	Undefined.	Panel button ON.
2	Off	00	0	Undefined.	No mechanical error.
	On	04	4	Undefined.	Mechanical error has occurred.
3	Off	00	0	No autocutter error.	
	On	08	8	Autocutter error occurred.	
4	Off	00	0	Fixed to Off.	
5	Off	00	0	No unrecoverable error.	
	On	20	32	Unrecoverable error occurred.	
6	Off	00	0	No automatically recoverable error.	
	On	40	64	Automatically recoverable error occurred.	
7	Off	00	0	Fixed to Off.	

Bit 3: If these errors occur due to paper jams or the like, it is possible to recover by correcting the cause of the error and executing **DLE ENQ n** ($1 \leq n \leq 2$). If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.

Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open during printing, bit 6 is On.

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB (TM-T88 III)	Status for ASB (TM-T90)
0	Off	00	0	Paper roll near-end sensor: paper adequate.	
	On	01	1	Paper roll near-end sensor: paper near end.	
1	Off	00	0	Paper roll near-end sensor: paper adequate.	
	On	02	2	Paper roll near-end sensor: paper near end.	
2	Off	00	0	Paper roll end sensor: paper present.	
	On	04	4	Paper roll end sensor: paper not present.	
3	Off	00	0	Paper roll end sensor: paper present.	
	On	08	8	Paper roll end sensor: paper not present.	
4	Off	00	0	Fixed to Off.	
5	Off	00	0	Reserved	
6	Off	00	0	Reserved	
7	Off	00	0	Fixed to Off.	

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB (TM-T88 III)	Status for ASB (TM-T90)
0	On	01	1	Reserved.	
1	On	02	2		
2	On	04	4		
3	On	08	8		
4	Off	00	0	Not used. Fixed to Off.	
5	Off	00	0	Reserved.	
6	Off	00	0		
7	Off	00	0	Not used. Fixed to Off.	

The notes indicated below apply only to the TM-T90 emulation.

Notes: . When the memory switch Msw 8-7 is On, the printer transmits the ASB data to the host whether the host can receive or not.

When the memory switch Msw 8-7 is On, the printer transmits the ASB data with the panel button status always being ignored.

See also: DLE EOT, GS r, Appendix G, Transmission Status Identification

6.11 Real time commands

The Real Time commands provide an application interface to the printer even when the printer is not handling other commands.

REAL TIME STATUS TRANSMISSION

Synopsis: Real time status transmission.

ASCII DLE EOT n

Hexadecimal 10 04 n

Decimal 16 4 n

Operand: n = 1-4

Value of n: 1 = Transmit printer status

2 = Transmit off-line status

3 = Transmit error status

4 = Transmit paper roll sensor status

Description: Transmits the selected printer status specified by *n* in real-time, according to the parameters above.

- The printer transmits the current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command cannot be executed when the printer is busy.
- When Auto Status Back (ASB) is enabled using the **GS a** command, the status transmitted by the **DLE EOT** command and the ASB status must be differentiated. (Refer to Appendix G, *TRANSMISSION STATUS IDENTIFICATION*)
- Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.

Notes:

- The status is transmitted whenever the data sequence of <10>H<04>H<n> (n = 1–4) is received.

Example:

In **ESC * m nL nH d1...dk**, d1=<10>H, d2=<04>H, d3=<01>H

- This command should not be used within the data sequence of another command that consists of 2 or more bytes.

Example:

If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before *n* is transmitted and then **DLE EOT 3** interrupts before *n* is received, the code <10>H for **DLE EOT 3** is processed as the code for **ESC 3 <10>H**.

Related Information :

n = 1 = Transmit Printer Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer open/close signal is LOW (connector pin 3)
	On	04	4	Drawer open/close signal is HIGH (connector pin 3)
3	Off	00	0	On-line
	On	08	8	Off-line
4	On	10	16	Not used. Fixed to On.
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 2 = Transmit communication interface Busy Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Cover closed.
	On	04	4	Cover opened.
3	Off	00	0	Paper feed button is not pressed.
	On	08	8	Paper feed button is pressed.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Printing not stopped due to paper condition.
	On	20	32	Printing stopped due to paper condition.
6	Off	00	0	No error condition.
	On	40	64	Error occurs.
7	Off	00	0	Not used. Fixed to Off.

Bit 5 Becomes on when the paper end sensor detects paper end and printing stops.

n = 3 = Transmit Error Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	-	-	-	Undefined.
3	Off	00	0	No auto cutter error.
	On	08	8	Auto cutter error occurs.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No autorecoverable error.
	On	40	64	Autorecoverable error occurs.
7	Off	00	0	Not used. Fixed to Off

Bit 3: If these errors occur due to paper jams or the like, it is possible to recover by correcting the cause of the error and executing DLE ENQ n (n = 1-2). If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.

Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open during printing, bit 6 is On.

n = 4 = Transmit paper roll sensor status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off
1	On	02	2	Fixed to On
2,3	Off	00	0	Paper roll near-end-sensor: paper adequate.
	On	0C	12	Paper near-end is detected by the paper roll near-end sensor.
4	On	10	16	Not used. Fixed to On
5,6	Off	00	0	Paper roll sensor: paper present.
	On	20	32	Paper roll end detected by paper roll sensor.
7	Off	00	0	Not used. Fixed to Off

See also: DLE ENQ, GS a, GS r

GENERATE PULSE AT REAL TIME

Synopsis: Generate pulse at real time.

ASCII DLE DC4 n m t

Hexadecimal 10 14 n m t

Decimal 16 20 n m t

Operand: n=1-2

m=0,1

t=1-8

Description: Outputs the pulse specified by t to connector pin m as follows:

<i>m</i>	Connector pin
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

- When the printer is in an error status when this command is processed, this command is ignored.
 - When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
 - The printer executes this command upon receiving it.
 - With a serial interface model, this command is executed even when the printer is offline, the receive buffer is full, or there is an error status.
 - With a parallel interface model, this command cannot be executed when the printer is busy.
 - This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).
- Notes:**
- If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
 - This command should not be used within the data sequence of another command that consists of 2 or more bytes.

See also: ESC p

REAL TIME REQUEST TO PRINTER

Synopsis: Real time request to printer.

ASCII DLE ENQ n

Hexadecimal 10 05 n

Decimal 16 5 n

Operand: n=1-2

Description: Responds to a request from the host computer. n specifies the requests as follows:

n Request

1 Recover from an error and restart printing from the line where the error occurred

2 Recover from an error aft clearing the receive and print buffers

- When the printer is disabled with **ESC** = (Select peripheral device), this command is effective.
 - This command is effective only when an auto cutter error occurs.
 - The printer starts processing data upon receiving this command.
 - This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
 - With a parallel interface model, this command cannot be executed when the printer is busy.
- DLE ENQ 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !**, **ESC 3**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC @**. This command is enabled only for errors that have the possibility of recovery, except for print head temperature error.

Notes:

- The status is transmitted whenever the data sequence of <10>H<05>H<n> (n = 1-4) is received.

Example:

In **ESC m nL nH d1...dk**, d1=<10>H, d2=<05>H, d3=<01>H

- This command should not be contained within another command that consists of 2 or more bytes.

Example:

If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **DLE ENQ 2** interrupts before n is received, the code <10>H for **DLE ENQ 2** is processed as the code for **ESC 3 <10>H**.

See also: DLE EOT

6.12 Bar code commands

These commands format and print bar codes.

SELECT PRINTING POSITION OF HRI CHARACTERS

Synopsis: Select printing position for HRI characters.

ASCII GS H *n*

Hexadecimal **1D** **48** **n**

Decimal 29 72 *n*

Range: *n* = 0-255

Operand: **n** = **Printing position**

0, 48 = Not printed

1, 49 = Above the bar code

2, 50 = Below the bar code

3, 51 = Both above and below the bar code

Default: *n* = 0

Description: Selects the printing position of HRI characters when printing a bar code.

- HRI indicates Human Readable Interpretation.
- HRI characters are printed using the font specified by **GS f**.

See also: GS f, GS k

SELECT BAR CODE HEIGHT

Synopsis: Select bar code height.

ASCII GS h *n*

Hexadecimal **1D** **68** **n**

Decimal 29 104 *n*

Range: *n* = 1-255

Operand: *n* = Number of dots in the vertical direction

Default *n* = 162

Description: Selects the height of the bar code.

See also: GS k

Synopsis: Print bar code second variation.

	<u>First Variation</u>					<u>Second Variation</u>				
ASCII	GS	k	<i>m</i>	<i>d1...dk</i>	<i>NUL</i>	GS	k	<i>m</i>	<i>n</i>	<i>d1...dn</i>
Hexadecimal	1D	6B	m	d1...dk	00	1D	6B	m	n	d1...dn
Decimal	29	107	<i>m</i>	<i>d1...dk</i>	0	29	107	<i>m</i>	<i>n</i>	<i>d1...dn</i>

Description: Selects a bar code system and prints the bar code.

Operands: *m* selects a bar code system as follows:

<i>m</i>		Bar Code System	Number of Characters	Remarks
(1)	0	UPC-A	<i>k</i> = 11-12	<i>D</i> = 48-57
	1	UPC-E	<i>k</i> = 11-12	<i>D</i> = 48-57
	2	JAN13 (EAN13)	<i>k</i> = 12-13	<i>D</i> = 48-57
	3	JAN 8 (EAN8)	<i>k</i> = 7-8	<i>D</i> = 48-57
	4	CODE39	<i>K</i> = / < 1	<i>d</i> = 48-57, <i>d</i> = 65-90, 32, 36, 37, 43, 45, 46, 47
	5	ITF	<i>k</i> = 1-(even number)	<i>D</i> = 48-57
	6	CODABAR	<i>K</i> = / < 1	<i>d</i> = 48-57, <i>d</i> = 65-68, 36, 43, 45, 46, 47, 58
(2)	65	UPC-A	<i>n</i> = 11-12	<i>D</i> = 48-57
	66	UPC-E	<i>n</i> = 11-12	<i>D</i> = 48-57
	67	JAN13 (EAN13)	<i>n</i> = 12-13	<i>D</i> = 48-57
	68	JAN 8 (EAN8)	<i>n</i> = 7-8	<i>D</i> = 48-57
	69	CODE39	<i>n</i> = 1-255	<i>d</i> = 48-57, <i>d</i> = 65-90, 32, 36, 37, 43, 45, 46, 47
	70	ITF	<i>n</i> = 1-255 (even number)	<i>D</i> = 48-57
	71	CODABAR	<i>n</i> = 1-255	<i>d</i> = 48-57, <i>d</i> = 65-68, 36, 43, 45, 46, 47, 58
	72	CODE93	<i>n</i> = 1-255	<i>D</i> = 0-127
	73	CODE 128	<i>n</i> = 2-255	<i>D</i> = 0-127

- (1):**
- This command ends with a NUL code.
 - When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes bar code data and processes the following data as normal data.
 - When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.
 - When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes bar code data and processes the following data as normal data.
 - The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.
- (2):**
- *n* indicates the number of bar code data, and the printer processes *n* bytes from the next character data as bar code data.
 - If *n* is outside of the specified range, the printer stops command processing and processes the following data as normal data.
- Standard mode:**
- If *d* is outside of the specified range, the printer only feeds paper and processes the following data as normal data.
 - If the horizontal size exceeds printing area, the printer only feeds the paper.

- This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following *m* as normal data.
- After printing bar code, this command sets the print position to the beginning of the line.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.
- This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.
- If *d* is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.
- If bar code width exceeds the printing area, the printer does not print the bar code but moves the data buffer position to the left side out of the printing area.
- The printer prints an HRI character as start character at the beginning of the HRI character string.
- The printer prints an HRI character as stop character at the end of the HRI character string.
- The printer prints HRI characters (+ an alphabetic character) as a control character (<00>H to <1F>H and <7F>H):

Control character				Control character			
ASCII	Hex	Decimal	HRI character	ASCII	Hex	Decimal	HRI character
NUL	00	0	U	DLE	10	16	P
SOH	01	1	A	DC1	11	17	Q
STX	02	2	B	DC2	12	18	R
ETX	03	3	C	DC3	13	19	S
EOT	04	4	D	DC4	14	20	T
ENQ	05	5	E	NAK	15	21	U
ACK	06	6	F	SYN	16	22	V
BEL	07	7	G	ETB	17	23	W
BS	08	8	H	CAN	18	24	X
HT	09	9	I	EM	19	25	Y
LF	0A	10	J	SUB	1A	26	Z
VT	0B	11	K	ESC	1B	27	A
FF	0C	12	L	FS	1C	28	B
CR	0D	13	M	GS	1D	29	C
SO	0E	14	N	RS	1E	30	D
SI	0F	15	O	US	1F	31	E
				DEL	7F	127	T

Example: Printing **GS k 72 07 67 111 100 101 32 51 57**



See also: GS H, GS f, GS h, GS w

When CODE128 ($m = 73$) is used:

2. Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively

Specific character	Transmit data		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
"{"	{{	7B, 7B	123, 123

Example: Example data for printing "No. 123456"

In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

GS k 73 10 123 66 78 111 46 123 67 12 34 56

- If the top of the bar code data is not the code set selection character, the printer stops command processing and processes the following data as normal data.
- If combination of "{" and the following character does not apply any special character, the printer stops command processing and processes the following data as normal data.
- If the printer receives characters that cannot be used in the special code set, the printer stops command processing and processes the following data as normal data.
- The printer does not print HRI characters that correspond to the shift characters or code set selection characters.
- HRI character for the function character is space.
- HRI characters for the control character (<00>H to <1F>H and <7F>H) are space.

Others: Be sure to keep spaces on both right and left sides of a bar code. (Spaces are different depending on the types of the bar code.)

See also: GS H, GS f, GS h, GS w, Page mode

SEE ALSO :

Description of the CODE128 Bar Code

In the CODE128 bar code system, 128 ASCII characters and 2-digit numerals can be represented using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets.

Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to 5FH
- Code set B: ASCII characters 20H to 7FH
- Code set C: 2-digit numeral characters using one character (100 numerals from 00 to 99)

The following special characters are also available in CODE128:

- SHIFT characters
In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.
- Code set selection character (CODE A, CODE B, CODE C)
This character switches the following code set to code set A, B, or C.
- Function character (FNC1, FNC2, FNC3, FNC4)
The usage of function characters depends on the application software. In code set C, only FNC1 is available.

SELECT BAR CODE WIDTH

Synopsis: Select bar code width.

ASCII GS w *n*

Hexadecimal **1D** **77** **n**

Decimal 29 119 *n*

Range: *n* = 2-6

Default *n* = 3

Description: Set the horizontal size of the bar code.

- Multi-level bar codes are as follows:
UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128
- Binary-level bar codes are as follows:
CODE39, ITF, CODABAR

n specifies the bar code width as follows:

<i>n</i>	Module Width (mm) for Multi-level Bar Code	Binary-level Bar Code	
		Thin element width (mm)	Thick element width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.5	0.5	1.25
5	0.625	0.625	1.625
6	0.75	0.75	2.000

See also: GS k

SELECT FONT FOR HUMAN READABLE INTERPRETATION (HRI) CHARACTERS

Synopsis: Select font for human readable interpretation (HRI) characters.

ASCII GS f *n*

Hexadecimal **1D** **66** **n**

Decimal 29 102 *n*

Range of *n* 0, 1, 48, 49

Description: Selects a font for the HRI characters used when printing a bar code.

n selects a font from the following table:

<i>n</i>	Font
0, 48	Font A (12 × 24)
1, 49	Font B (9 × 17)

- HRI indicates Human Readable Interpretation.
- HRI characters are printed at the position specified by **GS H**.

Default: *n* = 0

See also: GS H, GS k

6.13 Peripheral control command

GENERATE PULSE

Synopsis: Generate pulse.

ASCII	ESC	p	m	t1	t2
Hexadecimal	1B	70	m	t1	t2
Decimal	27	112	m	t1	t2

Range: m = 0, 1, 48, 49
t1 = 0-255
t2 = 0-255

Description: Outputs the pulse specified by t1 and t2 to connector pin *m* as follows:

- The pulse ON time is [t1 x 2 ms] and the OFF time is [t2 x 2 ms].
- If t2 < t1, the OFF time is [t1 x 2 ms]

m	Connector Pin
0, 48	Drawer kick-out connector pin 2.
1, 49	Drawer kick-out connector pin 5.

See also: DLE DC4

ISSUES AN AUDIBLE SIGNAL

Synopsis: Issues an audible signal.

ASCII	ESC	BEL	n
Hexadecimal	1B	07	n
Decimal	27	7	n

Range: 1, 2

Description: Issues an audible signal.

Parameter n=1 selects tone 1.

Parameter n=2 selects tone 2.

SELECT PERIPHERAL DEVICE

Synopsis: Select peripheral device.

ASCII	ESC	=	n
Hexadecimal	1B	3D	n
Decimal	27	61	

Range: $1 \leq n \leq 3$

Description: Selects device to which host computer sends data, using *n* as follows:

<i>n</i>	Function (TM-T88 III)	Function (TM-T90)
1	Specifies printer only.	
2	Specifies customer display only.	
3	-	Specifies printer and customer display.

Default: Serial interface specification:

- When turning on the printer: $n = 1$
- When executing **ESC @**:

	TM -T88 III		TM -T90
	<i>n</i>		<i>n</i>
Setting before executing ESC	1	2	3
After ESC @ processing	1	2	1

ENABLE/DISABLE PAPER END SIGNAL

Synopsis: Enable/disable paper end signal.

ASCII ESC c 3 *n*

Hexadecimal 1B 63 33 n

Decimal 27 99 51 *n*

Range of *n* 0-255

Description: Selects paper sensor(s) to output paper-end signals to a parallel interface.

- Each bit of *n* is used as follows:
- Each bit of *n* is used as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enabled
1	Off	00	0	Paper roll near-end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll end sensor enabled
3	Off	00	0	Paper roll end sensor disabled
	On	08	8	Paper roll end sensor enabled
4-7	-	-	-	Undefined

- It is possible to select multiple sensors to output signals. Then, if any of the sensors detects a paper end, the paper end signal is output.
- The command is available only with a parallel interface and is ignored with a serial interface.
- Sensor is switched when executing this command. The paper end signal switching be delayed depending on the receive buffer state.
- If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals
- If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.
- When all the sensors are disabled, the paper end signal always outputs a paper present status.

Default: $n = 15$

PRINT DATA IN PAGE MODE

Synopsis: Print data in page mode.

ASCII ESC FF

Hexadecimal 1B 0C

Decimal 27 12

Description: In page mode, prints all buffered data in the printing area collectively.

- This command is enabled only in page mode.
- After printing, the printer does not clear the buffered data, setting values for **ESC T** and **ESC W**, and the position for buffering character data.

See also: FF, ESC L, ESC S

SELECT PAGE MODE

Synopsis: Select page mode.

ASCII ESC L

Hexadecimal 1B 4C

Decimal 27 76

Description: Switches from standard mode to page mode.

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command has no effect in page mode.
- After printing by **FF** is completed or by using **ESC S**, the printer returns to standard mode.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:
 - (1) Set right-side character spacing: **ESC SP**, **FS S**
 - (2) Select default line spacing: **ESC 2**, **ESC 3**
- Only valve settings is possible for the following commands in page mode; these commands are not executed.
 - (1) Turn 90° clockwise rotation mode on/off: **ESC V**
 - (2) Select justification: **ESC a**
 - (3) Turn upside-down printing mode on/off: **ESC {** Set left margin: **GS L**
 - (4) Set printable area width: **GS W**
- The following command is ignored in page mode:
 - (1) Execute test print: **GS (A**
- The following command is not available in page mode:
 - (1) Print NV bit image: **FS p** Define NV bit image: **FS q**
 - (2) Write to NV user memory: **FS g 1**
 - (3) Print raster bit image: **GS v 0**

• The printer returns to standard mode when power is turned on, the printer is reset, or **ESC @** is used.

See also: FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS \$, GS \

SELECT STANDARD MODE

Synopsis: Select standard mode.

ASCII ESC S

Hexadecimal **1B** **53**

Decimal 27 83

Description: Switches from page mode to standard mode.

- This command is effective only in page mode.
- Data buffered in page mode are cleared.
- This command sets the print position to the beginning of the line.
- The printing area set by **ESC W** are initialized.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:
 - (1) Set right-side character spacing: **ESC SP**, **FS S**
 - (2) Select default line spacing: **ESC 2**, **ESC 3**
- The following commands are enabled only to set in standard mode.
 - (1) Set printing area in page mode: **ESC W**
 - (2) Select print direction in page mode: **ESC T**
- The following commands are ignored in standard mode.
 - (1) Set absolute vertical print position in page mode: **GS \$**
 - (2) Set relative vertical print position in page mode: **GS **
- Standard mode is selected automatically when power is turned on, the printer is reset, or command **ESC @** is used.

See also: FF, ESC FF, ESC L

SELECT PRINT DIRECTION IN PAGE MODE

Synopsis: Select print direction in page mode.

ASCII ESC T n

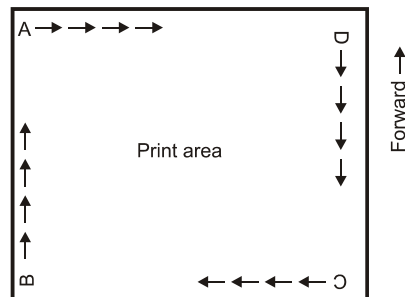
Hexadecimal 1B 54 n

Decimal 27 84 n

Range: n = 0-3
n = 48-51

n specifies the print direction and starting position as follows: .

n	Print direction	Starting position
0, 48	Left to right	Upper left (A in the figure)
1, 49	Bottom to top	Lower left (B in the figure)
2, 50	Right to left	Lower right (C in the figure)
3, 51	Top to bottom	Upper right (D in the figure)



Description: Selects the print direction and starting position in page mode.

- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- This command sets the position where data is buffered within the printing area set by **ESC W**.
- Parameters for horizontal or vertical motion units (x or y) differ as follows, depending on the starting position of the printing area:
 - If the starting position is the upper left or lower right of the printing area, data is buffered in the direction perpendicular to the paper feed direction: Commands using horizontal motion units: **ESC SP**, **ESC \$**, **ESC ** Commands using vertical motion units: **ESC 3**, **ESC J**, **GS \$**, **GS **
 - If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction: Commands using horizontal motion units: **ESC 3**, **ESC J**, **GS \$**, **GS ** Commands using vertical motion units: **ESC SP**, **ESC \$**, **ESC **

Default: n = 0

See also: ESC \$, ESC L, ESC W, ESC \, GS \$, GS P, GS \

SET PRINTING AREA IN PAGE MODE

Synopsis: Set printing area in page mode.

ASCII ESC W xL xH yL yH dxL dxH dyL dyH

Hexadecimal 1B 57 xL zH yL yH dxL dxH dyL dyH

Decimal 27 87 xL xH yL yH dxL dxH dyL dyH

Range: xL zH yL yH dxL dxH dyL dyH = 0-255
(except dxL=dxH=0 or dyL=dyH=0)

Description:

- The horizontal starting position, vertical starting position, printing area width, and printing area height are defined as x0, y0, dx, dy, respectively. Each setting for the printing area is calculated as follows:

$$x0 = [(xL + xH \times 256) \times (\text{horizontal motion unit})]$$

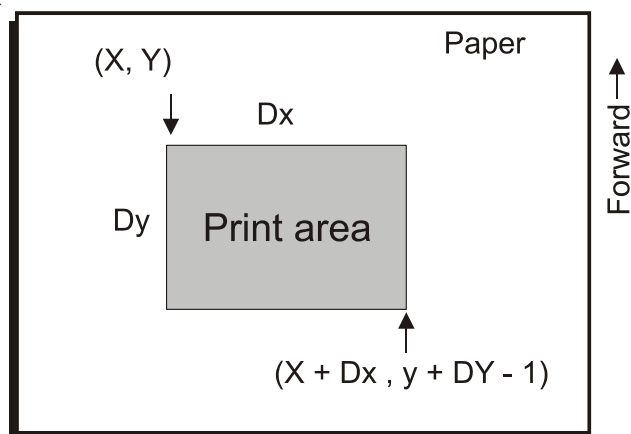
$$y0 = [(yL + yH \times 256) \times (\text{vertical motion unit})]$$

$$dx = [dxL + dxH \times 256] \times (\text{horizontal motion unit})$$

$$dy = [dyL + dyH \times 256] \times (\text{vertical motion unit})$$

The printing area is set as shown in the figure below.

- If this command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- If the horizontal or vertical starting position is set outside the printable area, the printer stops command processing and processes the following data as normal data.
- If the printing area width or height is set to 0, the printer stops command processing and processes the following data as normal data.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area.
- If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area - horizontal starting position).
- If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area - vertical starting position).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current printing area.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of minimum horizontal movement amount.
- Use the horizontal motion unit (x) for setting the horizontal starting position and printing area width, and use the vertical motion unit (y) for setting the vertical starting position and printing area height.
- When the horizontal starting position, vertical starting position, printing area width, and printing area height are defined as X , Y , Dx , and Dy respectively, the printing area is set as shown in the figure below.



- This printable area for this printer is approximately 72.2 mm {560/203"} in the horizontal direction and approximately 117.3 mm {940/203"} in the vertical direction.

Default:

$xL = xH = yL = yH = 0$

See also:

$dxL = 0, dxH = 2, dyL = 126, dyH = 6$

CAN, ESC L, ESC T, GS P

Note:

In the two-color print mode, the vertical direction is approximately 58.6 mm {470/203"}.

SET ABSOLUTE VERTICAL PRINT POSITION IN PAGE MODE

Synopsis: Set absolute vertical print position in page mode.

ASCII **GS** **\$** *nL* *nH*

Hexadecimal **1D** **24** **nL** **nH**

Decimal 29 36 *nL* *nH*

Range of nL 0-255

Range of nH 0-255

- Description:**
- Sets the absolute vertical print starting position for buffer character data in page mode.
 - This command sets the absolute print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$.
 - This command is effective only in page mode.
 - If the $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ exceeds the specified printing area, this command is ignored.
 - The horizontal starting buffer position does not move.
 - The reference starting position is that specified by **ESC T**.
 - This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:
 1. When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.
 2. When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.
 - The horizontal and vertical motion unit are specified by **GS P**.
 - The **GS P** command can change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

See also: **ESC \$**, **ESC T**, **ESC W**, **ESC **, **GS P**, **GS **, Page mode

SET RELATIVE VERTICAL PRINT POSITION IN PAGE MODE

Synopsis: Set relative vertical print position in page mode.

ASCII **GS** **** *nL* *nH*

Hexadecimal **1D** **5C** **nL** **nH**

Decimal 29 92 *nL* *nH*

Range of nL 0-255

Range of nH 0-255

- Description:**
- Sets the relative vertical print starting position from the current position in page mode.
 - This command sets the distance from the current position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$.
 - This command is ignored unless page mode is selected.
 - When pitch *N* is specified to the movement downward: $nL + nH \times 256 = N$
 - When pitch *N* is specified to the movement upward (the negative direction), use the complement of 65536.
 - When pitch *N* is specified to the movement upward: $nL + nH \times 256 = 65536 - N$

- Any setting that exceeds the specified printing area is ignored.
- This command operates as follows, depending on the print starting position set by **ESC T**:
 3. When the starting position is set to the upper left or lower right of the printing, the vertical motion unit (y) is used.
 4. When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (x) is used.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal and vertical motion unit. However, the value can not be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

See also: **ESC \$, ESC T, ESC W, ESC \, GS \$, GS P, Page mode**

6.15 Macro commands

CANCEL PRINT DATA IN PAGE MODE

Synopsis: Cancel print data in page mode.

ASCII CAN

Hexadecimal 18

Decimal 24

Description: In page mode, deletes all the print data in the current printable area.

- This command is enabled only in page mode.
- If data that existed in the previously specified printing area also exists in the currently specified printing area, it is deleted.

See also: ESC L, ESC W

SELECT PAPER SENSOR(S) TO STOP PRINTING

Synopsis: Select paper sensor(s) to stop printing.

ASCII ESC c 4 n

Hexadecimal 1B 63 34 n

Decimal 27 99 52 n

Range of n 0-255

Description: Selects the paper sensor(s) used to stop printing when a paper-end is detected, using n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enabled
1	Off	00	0	Paper roll near-end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2-7	-	-	-	Undefined

- When a paper sensor is enabled with this command, printing is stopped only when the corresponding paper is selected for printing.
- When a paper-end is detected by the paper roll sensor, the printer goes offline after printing stops.
- When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor for the paper sensor to stop printing.

Default: $n = 0$

ENABLE/DISABLE PANEL BUTTONS

Synopsis: Enable/disable panel buttons.

ASCII ESC c 5 n

Hexadecimal 1B 63 35 n

Decimal 27 99 53 n

Range of n 0-255

- Description:**
- When the LSB of n is 0, the panel buttons are enabled.
 - When the LSB of n is 1, the panel buttons are disabled.
 - Only the lowest bit of n is valid.
 - When the panel buttons are disabled, none of them are usable when the printer cover is closed.
 - In this printer, the panel buttons are the FEED button.
 - In the macro ready mode, the FEED button are enabled regardless of the settings of this command; however, the paper cannot be fed by using these buttons.

Default: $n = 0$

START/END MACRO DEFINITION

Synopsis: Start/end macro definition.

ASCII	GS	:
Hexadecimal	1D	3A
Decimal	29	58

Description: Starts or ends macro definition.

- Macro definition starts when this command is received during normal operation. Macro definition ends when this command is received during macro definition.
- When **GS ^** is received during macro definition, the printer ends macro definition and clears the definition.
- Macro is not defined when the power is turned on.
- The defined contents of the macro are not cleared by **ESC @**. Therefore, **ESC @** can be included in the contents of the macro definition.
- If the printer receives **GS :** again immediately after previously receiving **GS :** the printer remains in the macro undefined state.
- The contents of the macro can be defined up to 2048 bytes. If the macro definition exceeds 2048 bytes, excess data is not stored.

See also: GS ^

EXECUTE MACRO

Synopsis: Execute macro.

ASCII	GS	^	r	t	m
Hexadecimal	1D	5E	r	t	m
Decimal	29	94	r	t	m

Range:

r = 0-255
t = 0-255
m = 0, 1

Description: Executes a macro.

- *r* specifies the number of times to execute the macro.
- *t* specifies the waiting time for executing the macro.
- *m* specifies macro executing mode.

When the LSB of *m* = 0:

The macro executes *r* times continuously at the interval specified by *t*.

When the LSB of *m* = 1:

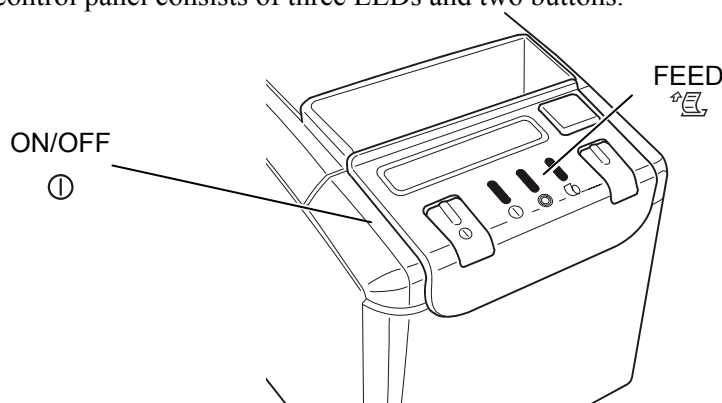
After waiting for the period specified by *t*, the PAPER OUT LED indicators blink and the printer waits for the FEED button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats the operation *r* times.

- The waiting time is $t \square 100$ ms for every macro execution.
- If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.
- If the macro is not defined or if *r* is 0, nothing is executed.
- When the macro is executed (*m* = 1), paper always cannot be fed by using the FEED button.

See also: GS :

7. CONTROL PANEL

The printer's control panel consists of three LEDs and two buttons.



7.1 Buttons

The following table indicates the functions of the buttons on the control panel:

ON/OFF	- Press once to power on the printer. - With the printer powered on, press for more than 2 seconds to power it off.
FEED	- Press once to advance the paper one line feed. - Press and hold down to advance the paper continuously. Press while powering on the printer to activate the Self-test.

The buttons on the control panel also have other functions. Refer to the chapter entitled Printer Setup.

7.2 LEDs

There are three LEDs on the console, indicating respectively:

LED 1 (P-ON)	Off	Printer powered off
	On Green	Printer powered on and on-line.
	Flashing Green	- Print head overheated. - Printer busy.
LED 2 (ERR)	Off	The printer is in its normal operating condition
	On Red	Signals the following error conditions: - Paper jam. - Cutter lock - Printer failure.
LED 3 (ROLL)	Off	Printer loaded with paper.
	On Yellow	Printer in almost out of paper condition.
	Flashing Yellow	Printer in out of paper condition.

8. OTHER INFORMATION

8.1 Printing and Paper Feeding

This line printer automatically feeds paper after printing the data. Therefore, when the line spacing for one line is set to a smaller value than the print data, paper may be fed more than the set amount just to print the data. For example, when the line spacing for one line is set to 10 dots (10/180 inches) and only paper feeding is executed, paper is fed for 10 dots; however, if bit-image characters are printed, paper is fed for 24 dots. (Refer to Table A.1.) When only rotated characters are printed on one line, paper feeding is executed as shown in Table A.1.

Table A.1 Paper Feeding Amount

		Required Paper Feeding Amount (dots)
Normal Characters	Font A	$27 \times \text{number of times enlarged in vertical}$
	Font B	$20 \times \text{number of times enlarged in vertical}$
Rotated Characters	Font A	$13 \times \text{number of times enlarged in vertical}$
	Font B	$10 \times \text{number of times enlarged in vertical}$
Bit image (ESC)		24

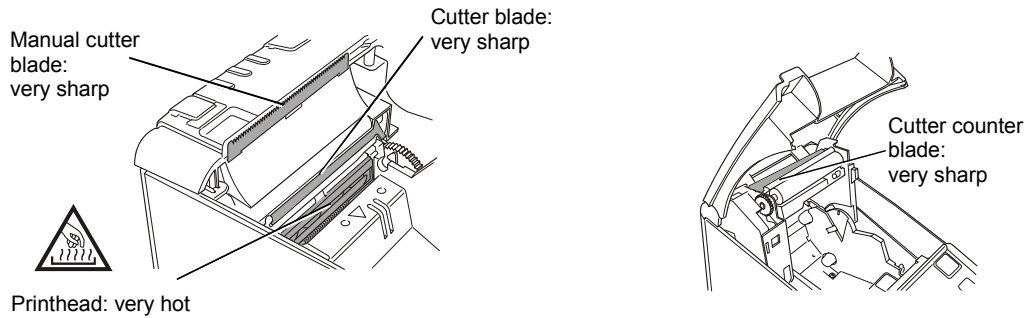
When the printer goes to the standby (data-waiting) state during printing, it temporarily stops printing and feeding paper. When data is transmitted and printing is executed, paper may shift 1 to 3 dots from the print starting position, which especially affects bit-image printing.

Interval of auto cutting operation in the receipt section. For driving the auto cutter of the receipt section, take the interval as a minimum of 10 lines of printing or paper feeding (to prevent small pieces of cut paper from dropping into the auto cutter).

8.2 Safety precautions and general operating norms

READ THIS SECTION CAREFULLY BEFORE PROCEEDING TO USE THIS PRODUCT.

- Make sure that the electrical characteristics of the printer's external power supply unit (110/240 Vac, 50-60 Hz) correspond to those of the electrical socket to which it is connected.
- Connect the printer to an electrical system compliant with the latest standards.
- Do not locate the printer in direct sunlight, near water, near heat sources or in humid or very dusty environments.
- In case of smoke, bad odors or unusual noise coming from the printer, unplug the external power supply and contact the field engineering service.
- To avoid the risk of injury, **do not touch** the parts indicated in the following figures:

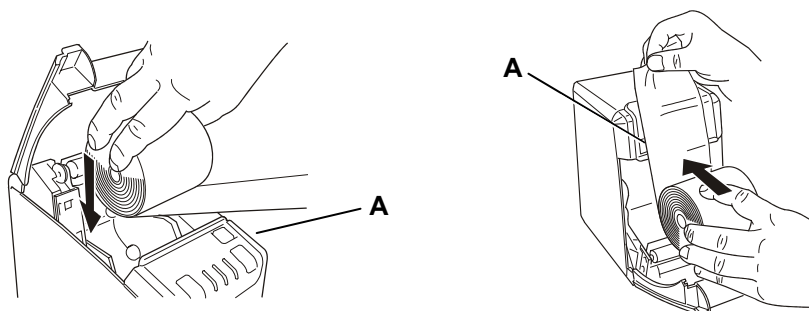


- Do not pull the receipt paper from its output slot when the printer cover is closed.
- Do not open the printer cover during a print job or when the incorporated cutter is cutting the receipt paper.
- Do not attempt to repair the printer except for following the troubleshooting procedures; contact the field engineering service.
- Do not disassemble or modify the printer.
- Do not insert foreign objects into the printer.
- Unplug the printer's external power supply unit from the electrical wall outlet if the printer is left unattended for long periods of time.
- If the printer is not used for long periods of time, it is suggested that you open its cover by pressing the OPEN button as far as it goes. This prevents feeble areas from appearing on initial printouts taken as soon as the printer is back into use

8.3 Loading the thermal paper roll

Step n°1: With the printer powered on, open the printer cover by pressing the Open button (A) on the operating console as far as it goes (until hearing a click sound indicating that the button is locked in a pressed position).

Step n°2: With the paper roll oriented as shown in the following figures, unroll about 20 cm of paper and then insert the roll into its compartment inside the printer while holding the unrolled portion of paper.



Step n°3: While holding the unrolled portion of paper, close the printer cover by pressing simultaneously on the right-hand and left-hand sides of the paper output slot. Make sure that the cover is properly closed on both sides.



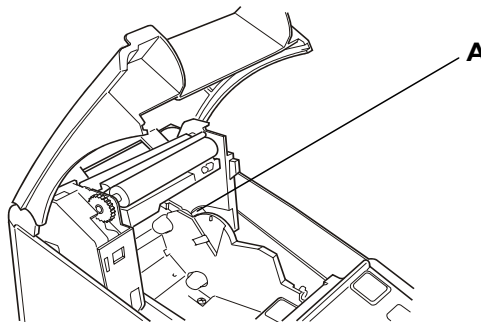
8.4 Adjusting the near paper end sensor

The near paper end detection sensor is adjusted at the factory so that it is functionally compatible with the most widespread paper rolls. This sensor can be adjusted accordingly, when either too much or not enough paper is still remaining when the condition is signaled.

The adjustment of this sensor depends upon the diameter of the core of the paper roll used. When moving the adjustment lever forward the near paper end condition is signaled when more paper is present, while moving the lever backward less paper will be present when the condition is signaled.

Proceed as follows to adjust the near paper end sensor:

- Open the printer cover by pressing the Open button on the operating console as far as it goes (until hearing a click sound indicating that the button is locked in a pressed position).
- Move the green adjustment lever (**A**) towards the front of the printer if you wish to have a more anticipated indication (in the case of cores with a larger diameter), or towards the rear of the printer if you wish to have a more delayed indication (in the case of cores with a smaller diameter).



- Load the roll of thermal paper.

9. TROUBLESHOOTING

Consult the table below before contacting the field engineering service to attempt to correct the malfunction by following the information provided.

Problems	Solutions
The printer does not power on.	Make sure that the power cord of the external power supply unit is properly connected to the electrical outlet. Make sure that the power cord of the external power supply unit is properly connected to the printer. Make sure that the building's electrical system is working correctly.
The paper is jammed.	Remove the paper roll, make sure that the paper compartment is clear of paper dust or residue and then reload the paper roll.
The paper is not cut (cutter locked).	Reset the cutter by opening and closing the printer cover. Open the printer cover and remove the wrinkled paper, then load paper roll again. Open the printer cover and then remove and reload the paper roll.
The yellow out/almost out of paper LED (ROLL) is on or flashing.	Load a new paper roll.
The red ERROR LED (ERR) is on.	If the paper is jammed, clear the paper jam by following the instructions of step 2. If the cutter is locked, unlock the cutter by following the instructions of step 3. In the case of a printer failure, contact the field engineering service.
The power LED (ON/OFF) is flashing.	Wait for the LED to stop flashing.
The paper is not fed.	Open the printer cover and then close it again by pressing simultaneously on the right-hand and left-hand sides of the cover's paper output slot.

CLEARING A PAPER JAM

- Power off the printer and open its cover.
- Remove the paper roll and check what caused the paper jam. When the paper roll compartment is clear of any paper residue, power on the printer and load the paper roll.

10.CLEANING YOUR PRINTER

WARNING: Before proceeding with any type of operation, unplug the power cord of the external power supply unit from the electrical power outlet and bear in mind the information provided in the chapter entitled Safety Precautions and General Operating Norms.

Cleaning the paper roll compartment

- Open the printer cover, remove the paper roll from the paper roll compartment and then clean the compartment with a soft cloth being very careful to avoid touching the print head and cutter blades.
- Load the paper roll.

Cleaning the printer case

- Clean the printer's external case using a soft cloth. Do not use solvents or hydrocarbon-based products.

Cleaning the print head

WARNING: The print head could be easily damaged so it is suggested that you clean it with extreme care, without scratching it.

- Open the printer cover and remove the paper roll.
- Gently pass a cotton swab dampened with isopropyl alcohol (IPA) over the surface of the thermal print head.
- Unroll about 20 cm of paper and, while holding the unrolled portion of paper; close the printer cover by pressing on the right-hand and left-hand sides of the paper output slot. Make sure that the cover is properly closed on both sides.

11. TRANSMISSION STATUS IDENTIFICATION

Because the specified status bits transmitted from this printer are fixed, the user can confirm the command to which the status belongs, as shown in the following table. When using Auto Status Back (ASB), however, process the consecutive three-byte code (except for XOFF) as ASB data after confirming the first byte of the ASB. Otherwise, the status transmitted by using the **GS r** and the status of the second and following bytes of the ASB cannot be differentiated.

Table G.1 Transmission Status Identification

Command & Function	Status Reply
GS I	<00>B
GS r	<00>B
GS a (1st byte)	<0 ₁ >B
GS a (2nd byte 4th bytes)	~>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0110>B
ASB (1st byte)	<0100>B
ASB (2nd to 4th bytes)	<00>B

12. PAGE MODE

12.1 Introduction

The printer operates in two print modes: standard mode and page mode. In standard mode, the printer prints and feeds paper each time it receives print data or paper feed commands. In page mode, all the received print data and paper feed commands are processed in the specified memory, and the printer executes no operations. All the data in the memory is then printed when an **ESC FF** or **FF** command is received.

The **ESC L** command puts the printer into page mode, and all commands received thereafter are processed in page mode. Executing an **ESC FF** command prints the received data collectively, and executing an **FF** command restores the printer to standard mode after the received data is printed collectively. Executing an **ESC S** command restores the printer to standard mode without printing the received data in page mode; the received data is cleared from memory instead.

12.2 Setting Values in Standard and Page Modes

The available commands and parameters are the same for both standard and page modes. However, these values can be set independently in each mode for the **ESC SP**, **ESC 2**, **ESC 3**, and **FS S** commands. For these commands, different settings can be stored for each mode.

Although the maximum number of printable dots for a bit image when the paper roll is selected as the print sheet is 560 in standard mode, 940 bit-image dots can be printed in the y direction (paper feed direction) in page mode. This is possible only when the **ESC W** command has specified 940 printable-area dots in the y direction and the printing direction value of *n* in the **ESC T** command is 1 or 3.

In the two-color mode, the vertical resolution is 470 lines (58.6 mm) for the TM-T90 emulation only.

12.3 Formatting of Print Data in the Printable Area

The printable area is set using **ESC W**. If all printing and feeding are complete before the printer receives the **ESC W** command, the left side (as you face the printer) is taken as the origin (x0, y0) of the printable area. The printable rectangular area is defined by the length (dx dots) extending from and including the origin (x0, y0) in the x direction (perpendicular to the paper feed direction), and by the length (dy dots) in the y direction (paper feed direction). If the **ESC W** command is not used, the printable area remains the default value.

When the printer receives print data after **ESC W** sets the printable area and **ESC T** sets the printing direction, the print data is formatted within the printable area so that point A in Figure 1 is at the beginning of the printable area as a default value. (When a character is printed, point A is the baseline.) Print data containing downloaded bit images or bar codes is formatted so that the bottom point of the left side of the image data (point B in Figure 1) is aligned with the baseline. However, any Human Readable Interpretation (HRI) characters are printed under the baseline. At the points labeled Point B, if characters (such as double-height characters) higher than normal size characters or downloaded bit image characters are received, any part of the character higher than the normal-size character is not printed.

If the print data (including the space to the right of a character) exceeds the printable area before the printer receives a command (e.g., **LF** or **ESC J**) that includes line feeding, a line feed is executed automatically within the printable area. The print position, therefore, moves to the beginning of the next line. The line feed amount depends on the values set by commands (such as **ESC 2** and **ESC 3**).

The default value of the line spacing is set to 4.23 mm (1/6") and corresponds to 30 dots in the vertical direction. If print data for the next line contains extended characters that are higher than double-height characters, bit images taking up two or more lines, or bar codes higher than normal characters, the amount of line feeding may be insufficient, resulting in overlapping of the characters' higher-order dots with the previous line. To avoid this, increase the amount of line spacing. The line spacing in Figure 3 requires 27 dots or more.

Example

When printing a downloaded bit image of six bytes in the vertical direction, use the following formula:
 $\{\text{number of vertical dots } (8 \times 6) - \text{number of dots for feeding at the beginning of the printable area } (21)\} \times \text{vertical motion unit conversions } (360/180) = 54$ Therefore, 27 dots (54 pitch) are required for feeding. Use the following commands:

ESC W *xL, xH, yL, yH, dxL, dxH, dyL, dyH*

ESC T *n*

ESC 3 54 ← Set line spacing to be added.

LF GS / 1

ESC 2 ← Reset the line spacing to 4.23 mm {1/6"}.

Note: Vertical and horizontal motion units are 1/360 in the vertical direction and 1/180 in the horizontal direction; therefore, the position you specify varies depending on the printing direction. Setting the vertical motion unit to 1/180 using the **GS P** command does not change the current print position.

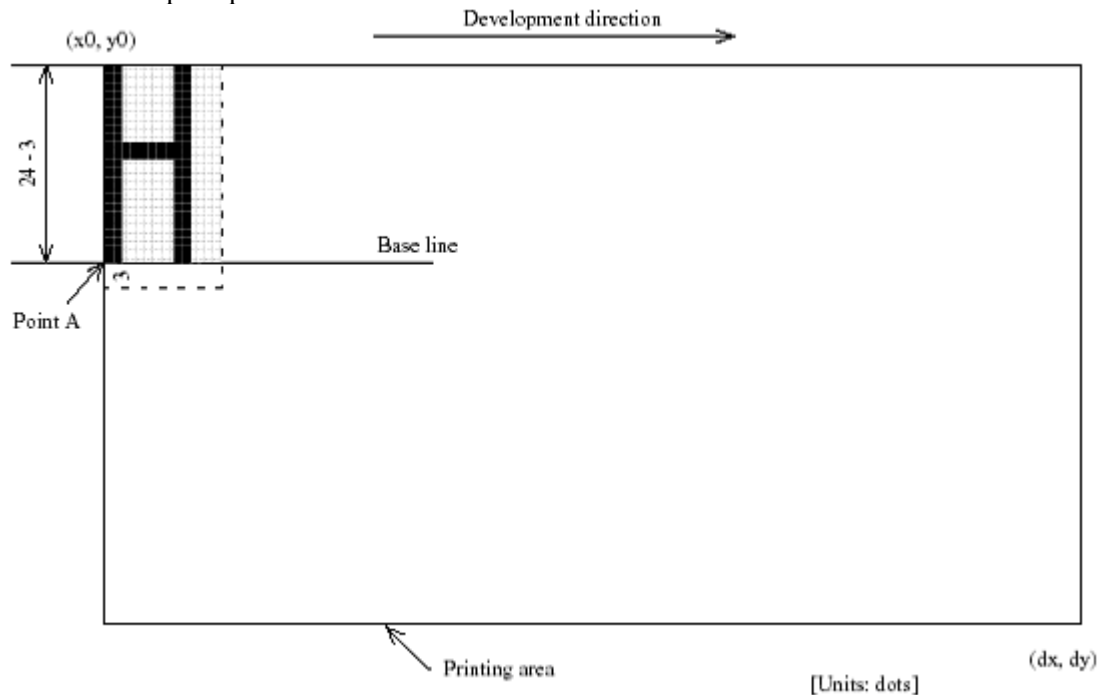


Figure 1 Character Data Developing Position

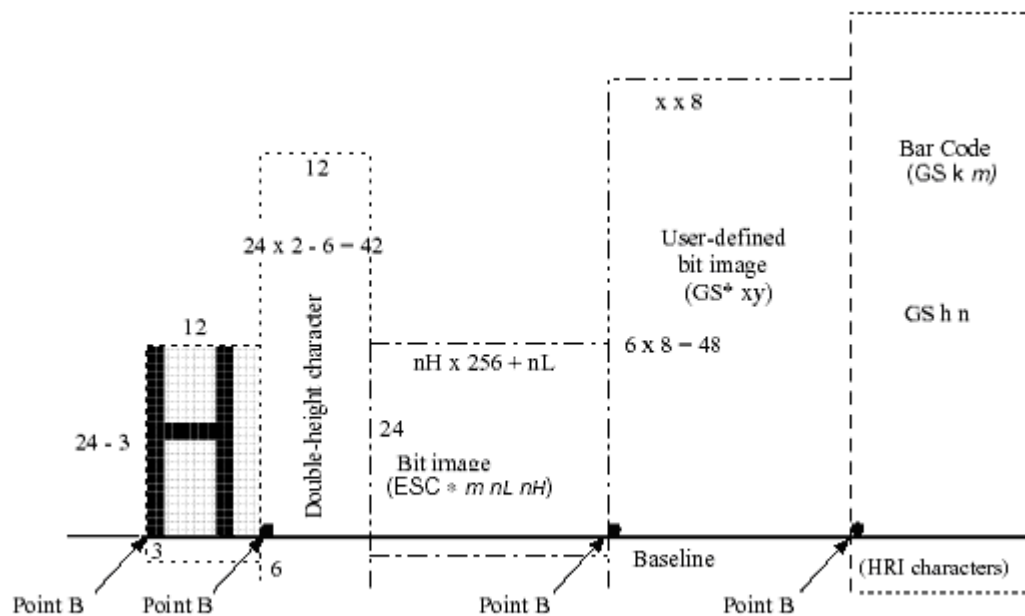


Figure 2 Print Data Developing Position



Figure 3 Downloaded Bit Image Developing Position